

Coimbatore - 641 046, Tamil Nadu, India

	Program Educational Objectives (PEOs)							
The PE	The PEOs of M.Sc. Data Analytics programme describe accomplishments that graduates are							
expecte	expected to attain within five to seven years after graduation							
	Apply terminologies and principles in problem solving adapting to applications of							
PEO1	Mathematics, Statistics, Business and emerging computing technologies in the field of Data							
	Analytics to conceptualize real world problems.							
DEO2	Exhibit proficiency as data analytics professionals through latest technologies to business and							
FEO2	organizations in demonstrating the ability for work efficacy							
PEO3	Work and collaborate with interdisciplinary backgrounds as a part of team to address the							
1105	contemporary issues with innovation							
DEO1	Pursue entrepreneurship, research and higher studies associated with the program to function							
rLO4	efficiently and effectively addressing challenging problems innovatively in the society							
DEO5	Communicate effectively, recognize and incorporate societal needs and constraints in their							
FEOJ	professional endeavour							
PEO6	Practice their profession as Data Analyst with high regard to ethical responsibilities.							



Progra	Program Specific Outcomes (PSOs)						
After th	After the successful completion of M.Sc Data Analytics Programme, the students are expected to						
demons	demonstrate						
DSO1	Knowledge on Data Analytics Principles and Components Data Acquisition, Data						
1301	Transformations, Big Data Platforms for analysis and Interpretation						
DSO2	Sound Knowledge of constructing data into meaningful structures by data curation and						
F302	reporting to predict and gather valuable Data Insights						
	Knowledge on using Statistics, Mathematics in designing Models and Algorithms for						
1303	achieving Business Objectives						
	Sound Knowledge on Data Analytics, Big Data Technology Tools, Visualization, Database						
PSO4	Management, Machine Learning and Programming for Analytics of Large scale Data to						
	support business processes and functions						
DSO5	Apply data science methods in assessing data requirements and integrating data analytic						
PS05	problem framework for domain specific applications						
DSOC	Communicate data assumptions, analysis and insights in written and visual dashboards and						
PS00	articulate as data story						
PSO7	Knowledge on Professional and ethical responsibility on data ownership and data privacy						

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Program Outcomes (POs)									
On succe	On successful completion of the M. Sc. Data Analytics program								
	Apply knowledge of mathematics, statistics, science and computing appropriately to								
PO1	model the software applications, configure software platform and analyze real time data in								
	heterogeneous domains.								
PO2	Design a system, component or process, tools to meet desired needs within realistic								
102	constraints such as economic, environmental, social, and ethical and safety contexts								
	Have an ability to design, implement, evaluate, analyze, interpret complex problems and								
PO3	data, provide sustainable computational solutions and synthesis of information to provide								
	valid conclusion for domains of business, healthcare, environment,.								
PO4	Create, Select and apply appropriate technologies, tools, techniques for data modelling,								
104	processing of complex problems and prediction for data analysis.								
	Communicate effectively with the computing community, and with society, about complex								
PO5	computing activities by being able to comprehend and write effective reports, design								
	documentation, demographics and make effective presentations.								
PO6	Manage projects and function effectively as an individual, and as a member or leader in								
100	diverse teams, and in multidisciplinary settings.								
PO7	Understand the impact of professional analytical solutions in societal and environmental								
107	contexts and apply the knowledge for benefit of individual for sustainable development.								
	Recognize the need for, and prepare them to engage in independent and life-long learning								
PO8	in the context of technological advancements for the betterment of individuals,								
	organizations, research community and society.								
PO9	Apply ethical principles, commit to professional ethics and responsibilities and human								
107	values.								
	Utilize the knowledge of education in understanding of data, management principles,								
PO10	computing solutions to apply on one's own work, as a member and leader in a team to manage								
	project in multidisciplinary environments and societal contexts.								

BHARATHIAR UNIVERSITY : : COIMBATORE 641 046

M.Sc. Data Analytics (Affiliated Colleges)

(Effective for the candidates admitted during the academic year 2023-2024 onwards)

SCHEME OF EXAMINATIONS – CBCS PATTERN

Course	Title of the Counce	Cuadita	Н	ours	Maximum Marks							
Code	The of the Course		Theory	Practical	CIA	ESE	Total					
	FIRST	SEMEST	ER			25 75 25 75 25 75 25 75						
	Paper I: Principles of Data Science	4	4		25	75	100					
	Paper II: Probability & Statistics	4	4		25	75	100					
	Paper III: Data Structure, Design and Analysis of Algorithms	4	4		25	75	100					
	Paper IV: Python Programming	4	4		25	75	100					
	Paper V: Data Privacy & Ethics	4	4		25	75	100					
	Practical I: Algorithm Lab	4	-	5	40	60	100					
	Practical II: Python Programming Lab	4	-	5	40	60	100					
	Total	28	20	10	205	495	700					
	SECOND	SEMES.	TER									
	Paper VI: Advanced Database Management Systems	4	4		25	75	100					
	Paper VII: Mathematical Foundation for Machine Learning	A nord 1- 4000	4		25	75	100					
	Paper VIII: Data Mining and Analytics	4	4		25	75	100					
	Paper IX: Data Visualization	4	4		25	75	100					
	Elective-I	4	4		25	75	100					
	Practical III: Data Analytics with R lab	4		5	40	60	100					
	Practical IV: Data Visualization lab	4		5	40	60	100					
	Total	28	20	10	205	495	700					

THIRD SEMESTER									
	Paper X: Big Data Analytics Framework & Tools	4	4		25	75	100		
	Paper XI: Machine Learning	4	4		25	75	100		
	Paper XII: Business Analytics	4	4		25	75	100		
	Elective II:	4	4		25	75	100		
	Practical V: Big Data Analytics Lab	4		5	40	60	100		
	Practical VI: Machine Learning Lab	4		5	40	60	100		
	Practical VII: Mini Project & Viva	2		4	25	25	50		
	Total	26	16	14	205	445	650		
	FOURT	H SEME	STER			•			
	Project and Viva Voce	8			50	150*	200		
	Total	8	2				200		
	Grand Total	90	ALL				2250		
	ONLINE COURSES								
1	#SWAYAM/MOOC	2							
2	#Job Oriented Certificate Course	2		/					

* Project Evaluation – 100 marks & Viva Voce – 50 marks in ESE

During II or III Semester (Optional)

List of Electives

Elective – I								
1. Social Media Mining								
2. Text Analytics								
3.	Virtualization and Cloud							
Elective – II								
1.	Behavioural Data Analytics							
2.	Internet of Things							
3.	Health Care Data Analytics							
4.	Deep Learning							

		PRINCIPLES OF DATA SCIENCE L T								
Core/El	ective/Supportive	Core		4			4			
Pre-req	uisite	Nil	Syllabus Version		202	23-2	024			
Course Objectives:										
The main objectives of this course are to:										
1. T	o understand Data so	ource evolution, data Characteristics and	data process	sing m	odels	•				
2. T	2. To understand and apply data processing architecture ,Eco System Components of Big Data									
F	rameworks HADOC	DP, SPARK Map Reduce								
To analy	To analyze and Build Data Science use cases for specific domain and applications.									
Expecte	ed Course Outcome	s:								
On the s	successful completion	n of the course, student will be able to:								
1	Understand Data s	ources, generations, data formats, Data H	Evolution, D	ata fro	m H	K1, I	\$2			
	various domains									
2	Understand Big Dat	ta Characteristics What, Why, When, Lin	nitation of tra	adition	al					
-	approaches and mo	dels. Map Big Vs to Data Domains			ł	<u>K3</u>				
3	Understand Big Da	ta				<u>(2</u>				
4	Understand the Ro	ole of Big Data and Artificial Intellige	ence – Ethi	cs - I	41 F	К2-К	.5			
_	Applications			•		7 A T	TE VC			
5	Analyze various do	Definition of Big Data Characteristics, Pla	tform, Progr	ammii	ng r	\4-K	-3 K6			
	Model and Design	n Big Data framework ecosystem, a	ind data pro	ocessii	ng					
V1 Do	mambar W2 Under	ans of Marketing, Health Care and Supp	Evoluctor V		ata					
KI - KC	Introduction to De	to Evolution & Sources	Evaluale, N	$\frac{1}{1}$	2ale 2 h	01110				
Data Ex	volution: Data Devel	opment Time Line ICT Advancement	nt_a Perspect	ive	Data	Gro	y wth_a			
Perspect	tive – IT Componen	ts-Business Process – Landscape-Data	to Data Scie	nce –	Data Unde	orsta	nding			
data. In	troduction – Type of	f Data: Numeric – Categorical – Graphi	ical – High	nee Dimen	siona	l D	ata —			
Data Cl	assification – Data I	Formats: Structured Semi-Structured an	d Un-Struct	ured –	Data	a So	urces:			
Time Se	eries – Transactional	Data – Biological Data – Spatial Data –	Social Netw	ork.	2					
Unit:2	Data Science	A REAL	1	12	2 h	ours	3			
Data Sc	ience: Data Science	- A Discipline – Data Science vs Statistic	cs, Data Scie	nce vs	Mat	hem	atics,			
Data So	cience vs Programn	ning Language, Data Science vs Data	base, Data	Scienc	e vs	Ma	chine			
Learnin	g. Data Analytics- F	Relation: Data Science, Analytics and E	Big Data An	alytics	. Dat	a Sc	ience			
Compor	nents – Big data tech	nology – Data Science user- roles and sk	tills.							
Unit:3	Big Data Towards	Data Science		12	2 h	ours	\$			
Big Dat	a: Introduction To B	ig Data: - Evolution - Data as Economy	/ - What is E	Big Da	ta – S	Sour	ces of			
Big Dat	a. – Big Data Myth	as - Characteristics of Big Data 6Vs –	Big Data U	Jse ca	ses -	Big	data-			
Challen	ges of Conventional	Systems Data Processing Models	Limitation of	of Con	venti	onal	Data			
Processi	ing Approaches - I	Data Discovery-Traditional Approach,	Big Data To	echnol	ogy:	Big	Data			
Explora	tion - Data Augmen	itation – Operational Analysis – 360 Vi	iew of Custo	omers	– Seo	curit	y and			
Intellige	nce.	Dolog and Skills		1/	<u> </u>					
Unit:4	Dig Data and AI : I	Learning Demonstrange Termingle size	Maahim		<u>2 n</u>	ours	; Tavrasl			
AI: COg	gnuve Computing :	NLP Speech Processing Pig Date	ond AI Et	e Leai		- г Раса	veural			
Advance	ed Applications AI	- INLF – Speech Flocessing – Big Data Myths – Data Science Roles, Data Scien	aliu AI – Eu itist Data Ai	nics m rehitee	AI I t Da	tese	alcii - nalvet			
– Machi	Machine Learning Engineer Skills									
Unit.5	Unit:5 Data Science Use cases 10_ hours									
Data Sc	ience & Big Data Us	e cases Specifications and Discussion – 1	Data Sources	Ident	ificati	ion –	- Data			
Type	Types Data Classification Data Characteristics of Dig V's Data Science D's Dig Data Engranded									
Doto	Types – Data Classification – Data Characteristics of Big V's – Data Science P's – Big Data Frameworks									
	Mortestin - D	aile Ingurance Disk and Constitute U	Customer I	nsigiiti mel (5 — E 716-5		viotice			
Analysi	s –- markening – Reta	ans – insurance – Kisk and Security –Hea	ann care – St	иррту (Liiain		gistics			

Unit:6	Contemporary Issues		2 hours							
Expert lectures, online seminars – webinars										
	Total Lecture hours		60 hours							
Text B	ook(s)									
1	V. Bhuvaneswari, T. Devi, "Big Data Analytics: A Practiti	oner's App	roach", Sci-Tech							
	Publications, 2016.									
2	Han Hu, Yonggang Wen, Tat-Seng, Chua, XuelongLi,"Toward Scalable Systems for Big",									
3	Seema Acharya, Subhashini Chellappan, "Big Data and Analy	tics", Wiley	Publication, first							
	edition. Reprint in 2016									
4	Joel Grus, "Data Science from Scratch", 2nd Ed	dition, O'R	eilly Publisher,							
	ISBN: 9781492041139, May 2019									
Refere	nce Books : EBooks									
1	SinanOzdemir, Sunil Kakade, "Principles of Data Science", Se	econd Edition	n, [Packt]							
2	David Natingga, "Data Science for Algorithms in a Week", S	econd Editio	n, [Packt]							
3	PrabhanjanTattar, Tony Ojeda, Et al, "Practical Data Science	Cookbook"	, Second Edition,							
	[Packt], ISBN: 9781787129627									
4	Lillian Pierson, Jake Porway, "Data Science for Dummies", S	Second Edition	on, John Wiley &							
	Sons, Publishers, ISBN: 9781119327639, 2017		-							
5	Field Cady, "The Data Science Handbook", John W	Viley & S	ons, Publishers,							
	ISBN: 9781119092940, 2017									
Relate	d Online Contents [MOOC, SWAYAM, NPTEL, Websites etc	:.]								
	G									
_	Course Title	Duration	Provider							
1.	Python for Data Science	4 Weeks	Swayam							
2.	Introduction to Data Science in Python (Free)	4 Weeks	Coursera							
3.	Intro to Data Science (Free)	8 Weeks	Udacity							
4.	Data Science Certification Training – R Programming	14 hours	Simlilearn							
5.	Data Science with Python	15 hours	Simplilearn							
Web li	nk									
1.	hthttps://builtin.com/data-science									
2.	https://www.udacity.com/course/intro-to-data-scienceud359									
3.	https://www.tutorialspoint.com/python_data_science/index.htm									

	Mapping with Programme Outcomes												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	-	S	М	М	S	-	L	М	М	S			
CO2	-	-	S	S	S	-	М	М	М	М			
CO3	S	S	S	S	S	М	S	М	S	S			
CO4	М	М	М	S	S	М	L	М	S	S			
CO5	S	S	S	S	S	М	М	S	S	S			

			PROBABILITY AND STATISTICS	L	Т	Р	C			
Cor	e/Electiv	e/Supportive	Core	4			4			
Pre	e-requisi	te	Nil	Sylla Vers	bus	202	3- 1			
Соц	rse Ohie	ectives:		VUS		202	4			
The	main obj	ectives of this cour	se are to:							
	1. To i	inderstand the Prob	ability Theory							
	2. To understand theoretical distributions and automata theory									
Exp	Expected Course Outcomes:									
On	the succ	essful completion of	f the course, student will be able to:							
1	To un	derstand the concep	ot of matrices			K2				
2	To app	ply the principle of	probability			К3				
3	To ap	ply and analyse the	e statistical measures for specific domain			K3				
4	To ana	alyse regression mo	odels and apply hypothesis testing specific domain			K4				
5	To des	sign and illustrate d	istribution models for specific domains			K5,	K6			
K1	- Remen	nber; K2 - Underst	and; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6	- Cre	eate					
			and Buddeline							
I	Unit:1	Introduction to S	Set Theory		10	hou	irs			
Set	Theory:	Basic set operation	ns, relations and functions, transitive closure re	lation	, pri	ncipl	e of			
math Cavl	nematical lev Hami	l induction. Matrice	es: Properties of determinants, inverse of a matrix, I	Eigen	valu	es an	ıd			
Cuyi	icy mann		Tran Mana Carlo and							
l	Unit:2	Probability Theo	ry		12	hou	irs			
Intro prob	oduction ability, E	to Probability Th Bayes' theorem, inc	eory: Sample space and events, axioms of Problependence of events.	abilit	у, со	onditi	onal			
			AND ATE TO LLAND							
U	Jnit:3	Descriptive Stati	stics		12 -	- hou	ırs			
Freq	uency D	Distribution - Conti	nuous or Grouped Frequency Distribution - Mag	gnitud	e of	Clas	SS Sf			
Cent	tral Tend	lency: Arithmetic I	Mean. Geometric Mean - Harmonic Mean - M	II - IV. Iediar	ieast	lode	л -			
Disp	ersion: (Overview - Mean	Deviation - Standard Deviation - Combined Star	ndard	Dev	iatio	1			
-	[]	Humothogia Togti		<u> </u>	10	hou				
Corr	elation -	Rank Correlation -	ng Regression - Test of Hypothesis - Large Sample - Te	st_Srr	12 all S	amn	ITS Ie			
Test	-t test –C	Chi Square Test –F-	test – ANOVA-one way and two way	5t-511		amp	C			
										
	Unit:5	Theoretical Dist	ibution	Distri	12	hou	rs			
I neo Norr	oretical L	istribution: Binom	Cumulative Poisson Process and its generalization	- ann	licati	on - Ions i	n			
diffe	erent busi	ness domain - ARI	MA and ARIMA - Monte Carlo Simulations	"PP	iiouu					
Um	it.6	Contomnorous	261106	<u> </u>)_h/				
Expe	ert lectur	es, online seminars	– webinars	<u> </u>	4	11(JUI 8			
			Total Lecture hours		60	hou	irs			

Те	ext Book(s)	SCAA DATEI	D: 18.05.2023					
1	1 William A. R. Weiss "An Introduction to Set Theory" Publisher: University of Toronto 2008							
2	2 RafVandebril, Marc Van Barel, Nicola Mastronardi, "Matrix Computations and Semiseparab Matrices: Eigenvalue and Singular Value Methods", JHU Press, 2009.							
3	By Vijay K. Rohatgi, A.K. Md. EhsanesSaleh. "An Introduction To Probability And Statistics" , ISBN: 978-1-118-79964-2, 3rd Ed , 2015.							
4	S.P Guptha "Statistical Methods", Sultan Chand and Sons							
5	R.S.N. Pillai, Bagavathi, "Statistics Theory and Practice, S.Chand&	Company, 201	3					
Re	eference Books							
1	Charles E. Roberts, Jr, "Introduction to Mathematical Proofs A	Transition to A	Advanced					
	Mathematics" Denny Gulick, 4 th Edition, Published by Pearson, ISBN:9780134746753,							
	2018.							
2	John R. Hauser, "Numerical Methods for Nonlinear Engineerin	g Models", Spr	inger					
	Netherlands, ISBN: 9401777071, 9789401777070, 1013 pages, 20)17.						
Re	elated Online Contents [MOOC, SWAYAM, NPTEL, Websites et	tc.]						
	Course Title	Duration	Provider					
1	Advanced Probability Theory	12 Weeks	Swayam					
2	Discrete Mathematics	12 Weeks	Swayam					
3	Numerical Methods And Simulation Techniques For Scientists	8 weeks	Swayam					
	and Engineers							
4	Theory of Automation	8 Weeks	Swayam					

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	М	М	М	М	S	S	L	S
CO2	S	М	М	М	М	М	S	S	L	S
CO3	S	S	S	S	М	М	М	М	L	S
CO4	S	S	S	S	М	М	М	М	L	S
CO5	S	S	S	S	S	М	S	S	L	S

			DATA STRUCTURES, DESIGN AND ANALYSIS OF ALGORITHMS	A DA] L	TED: 1 T	18.05.2 P	023 C				
Core/H	Elective	/Supportive	Core	4			4				
Pre-1	requisi	te	Nil	Sylla Versi	bus on	2023 2024	-				
Cours	se Obje	ectives:									
The m	ain obj	ectives of this could be the students to	urse are to:	hma							
2.	. Enat	nderstand and ana	alysis concepts of Algorithmic analysis and algorithmic	ithm a	pproac	hes.					
Expec	ted Co	ourse Outcomes:									
On the successful completion of the course, student will be able to:											
1	1 Develop and understand on data structures, the information arranged in memory of computer, information manipulation with the use of algorithms in a data structure.										
2	Get kn	owledge about al	gorithms and determines their time complexity.			K2					
3 Demonstrate specific search and sort algorithms using divide and conquer K technique.											
4Gain good understanding of Greedy method and its algorithmK2,K3											
5	5 Design and analysis of algorithms for problem solving by using the suitable K4,K5, K6 algorithmic technique										
K1 -	Remer	nber; K2 - Unders	stand; K3 - Apply; K4 - Analyze; K5 - Evaluate;	K6 – (Create						
Unit	:1	Introduction to	Data Structures	12-	- hou	rs					
Eleme Graph	entary I Travei	Data Structure: Sta rsal & Search Tec	ack – Qu <mark>eue– Tree – Binary Tre</mark> e – Binary Searc hnique.	h Tree	e – Hea	ap - Gr	aphs –				
Unit	:2	Introduction to	Algorithms	12-	- hou	rs					
Algori Oh no	ithm Do tation -	efinition and Spec - Omega notation	ification – Space complexity-Time Complexity- A – Theta notation – Average case analysis.	Asymp	totic N	lotatior	ıs: Big				
Unit	:3	Design of Algor	ithms	10-	- hou	rs					
Divid	e and C	Conquer: General	Method, Binary Search, Merge sort, Quick sort.	10	1						
Creed	:4 v Moth	Greedy Method	hlam Minimum Cost granning trace. Single sour	12-	- nou	rs					
Unit	5	Dynamic Progra	amming	<u>12-</u>	- hou	rs					
Dynan Back Bound	nic Pro Trackii l: Gene	ogramming: Mult ng: 8-queens prob ral method, Trave	istage graphs, All pair's shortest paths, Travell blem, Sum of subsets, Graph coloring, Hamilto elling salesperson problem.	ing sa mian c	lespers cycles.	son pro Branc	blem. h and				
Unit	:6	Contemporary	Issues	2 h	ours						
Expert	t lectur	es, online seminar	rs – webinars								
	Total Lecture hours 60 hours										

Tex	t Book(s)
1	Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, "Fundamentals of Computer
	Algorithms", Galgotia Publications, 2011.
2	Luciano Ramalho, "Fluent Python: Clear, Concise, and Effective Programming", O'Reilly, ISBN:
	9781491946008, <i>2014</i> .
3	Kleinberg and Tardos: "Algorithm Design", Pearson, ISBN: 0132131080 2018.
Ref	erence Books : EBooks
1	Dr. Basant Agarwal, "Hands-On Data Structures and Algorithms with Python: Store, manipulate,
	and access data effectively and boost the performance of your applications", Packt Publishing
	Limited, 3rd edition, 2022
2	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to
	Algorithms", Massachusetts Institute of Technology, MIT Press, III Edition, 2009.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]										
	Course Title	Duration	Provider							
1.	Python for Absolute Beginners	4 hours 24 m	Udemy							
2.	Data Structures	5 hours	Coursera							
3.	Data Structures Fundamentals (Free)	6 Weeks	edX							
4.	Design and Analysis of Algorithm (Free)	11 Weeks	NPTEL							
5.	Design and Analysis of Algorithms (Free)	8 Weeks	SWAYAM							
Web li	nk									

- 1. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/
- 2. https://www.javatpoint.com/daa-tutorial
- 3. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms

Mappin	Mapping with Programme Outcomes												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	S	М	М	S	COCATE TO LLESS	М	-	L	-	L			
CO2	М	S	S	S	L	М	-	М	-	L			
CO3	S	S	S	S	_	М	L	L	-	М			
CO4	S	S	S	S	_	М	L	L	-	М			
CO5	S	S	S	S	-	М	S	S	М	S			

			PYTHON PROGRAMMING SCAA	A <mark>D</mark> A	Γ F D:	1 8.0	5. 2 02		
Core	/Elective	e/Supportive	Core	4			4		
Pre	-reauisi	te	Nil	Sylla	bus	202	3-		
				Versi	ion	202	4		
Cou	rse Obje	ectives:							
1	. To ur	derstand the basic	cs of Python Data structures and Programming con	nstruc	ets				
2	2. Tour	derstand and App	bly Python Libraries for Data Science and Machine by Exploratory Data Analytics using Data Visualiz	e Lea	rning				
	<u>. 10 ui</u>		ly Exploratory Data Analytics using Data Visuanz	Lation					
Exp	ected Co	ourse Outcomes:							
On	the succ	essful completion	of the course, student will be able to:						
1	Unders	tand the basic pro	gramming structure-List, Dictionary, Tuple, Strin	g		K1,	K2		
2 Understand the Control structures and object oriented concepts									
3 Design and Analyze dataset applying statistical models, visualization and models K3 using various tools									
4	Unders	tand the viewelize	tion methods neekages statistical neekages and	othor		K3,	K4,		
packages for building data models									
5 Design data analytic model using the packages in python and provide inferences for K3 multi-disciplinary domains									
K1	K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create								
Uni	it:1	Introduction			10) hours			
inter outp Oper Conc Pack	preter, C ut, Varia cators, C ditional cages, Co	to Python: Pyth Dverview of progra bles and assignme Comparison Oper (or ternary) Operation	ramming in Python, Basic data types, Program i ent. Global and local variables. Python - Basic Ope ators, Logical (or Relational) Operators, Assig ators. Modules: Importing module, Math module	reatur nput erator gnmer Rano	es , and H s: Ari t Op dom 1	Pyth Progra ithme perato modu	on am tic ors, ile,		
Uni	it:2	Advanced Data	Types		12	ho	urs		
Pyth spec: Strin Oper Prop meth	Python Strings and string manipulation [Assigning values in strings, String manipulations, String special operators, String formatting operators, Triple Quotes, Raw String, Unicode String, Build-in-String methods], Python List : Introduction, Accessing values in list, List manipulations, List Operations, Indexing, slicing & matrices. Python Dictionary - Introduction, Accessing values, Properties, Functions in Dictionary. Python Tuples: Introduction, Operation, Accessing, Function and methods in tuples and Data Type Conversion Python sets								
Uni	it:3	Control Structu	res		12	ho	urs		
Cont Cont Fina Anot OOF	ditional rrol State lly. Func nymous Ps: Class	Statement: Branc ements: break, con- ctions : Defining a functions, Regula , Object, Inheritan	hing (if, else-if, nested), Looping: while statem ntinue and pass Statements. Python Exception Ha function, Calling a function, Types of functions, ar expressions : Match function, Search function ace and Constructor.	ient, z andlir Funct , Mo	for st ng: Tr ion A difier	atem ry, C .rgun s. Py	ents, atch, ients thon		

Unit:	4 P	ython Lib	oraries fo	or Data S	Science					12 hours
Reading and Writing CSV Files in Python using CSV Module, NumPy [Arrays and matrices]: N- dimensional data structure, Creating array, Indexing array, Reshaping, Vectorized operations, Pandas [Data Manipulation]: Create Data Frame, Combining Data Frames, Summarizing, Columns selection, Rows selection (basic), Rows selection (filtering), Sorting, Descriptive statistics, Rename values, Dealing with outliers.SciPy Introduction, Basic functions, Special functions(scipy.special), Integration(scipy.integrate), Optimization (scipy.optimize).TensorFlow: Computation with TensorFlow, Regression with Tensorflow										
Unit:	5 P	ython Lib	oraries fo	or NLP a	nd Visu	alizatior	ı			12 hours
NLTK,: tokenizing, part-of-speech tagging, stemming,Sentence Segmentation, Methods for cleaning and normalizing text.Textblobn-grams, Parsing, Spelling correction. Visualization libraries : matplotlib, Seabon: Simple Line Plots, Simple Scatter Plots, Density and Contour Plots, Histograms, Customizing Colorbars, Subplots, Text and Annotation, Visualization with Seaborn										
Unit:	6 C	ontempo	rary Issu	es						2—hours
Fynert	lectures	online se	minars _	webinar	s					
Total Lecture hours								60 hours		
Text	Book(s)				E. PAL					
1 Jake VanderPlas, "Python Data Science Handbook" O'Reilly, 1st Edition, 2017.										
2 Ar Ed 3 Dr Ev	idreas C ition, 20 . Charle erybody	Muller & 16. s Russell : Explorin	z Sarah C Severano g Data ir	Guido "Ir Ce, Sue I Python	Blumenb 3",Creat	on to Ma erg, Ellio eSpace, 2	ott Haus 2016.	earning v er, Aime	vith Pyth ee Andrie	on", O'Reilly, 1
Dofor	onco Ro	oke		6	PRATRIAN	Universit				
		Thun "C	Dra Dratha	n Drogra	mmin a''	2nd Edit	ion Door	on Edu	action 20	16
$\frac{1}{2}$ M	ark Sum	$\frac{1}{1}$	Program	ming in	Python 3	$^{\prime\prime}$ Pearso	ion, Pear	$\frac{1}{100}$		10.
2 101		incriticitu ,	Tiogram		i yuloli 5	, 1 carse			0.	
Rolat	d Onlin	o Conton	te [MOC		VAM	NPTFI	Wohsite	s etc]		
	YTHON	I - A to Z	Full Cour	rse for B	eginners	https://x	www.ude	emy com	/	
2 P	vthon fo	r Data Sci	ence. htt	ps://sway	am.gov.	in/	<u></u>	<u></u>		
3 P	ython fo	r Data Sci	ence and	Machine	e Learnir	ng Bootc	amp, http	os://www	.udemy.	com/
4 I	ntroduct	on to Pyth	non Progr	ramming	, <u>https://v</u>	www.uda	acity.com	<u>n/</u>	•	
Марр	oing with	n Progran	nme Out	comes						
COs	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	S	М	-	-	-	-	-	L
CO2	S	-	-	S	-	-	Μ	L	-	L
CO3	М	S	S	М	L	L	М	L	-	-
CO4	S	Μ	S	L	-	-	-	S	Μ	М
CO5	S	S	S	-	-	Μ	-	L	S	S

Course code	DATA PRIVACY AND ETHICS	A D <mark>A</mark> TI	E P :	18 -0 5.	2023					
Core/Elective/Supportive	Core	4			4					
Pre-requisite	Nil	Syllab	us	2023	}_					
		Versio	n	2024	,					
Course Objectives:										
The main objectives of this course	are to:									
1. To understand Data source	evolution, data exploration, data format and	structur	e.							
2. To understand the importan	ce of Data privacy, ethics and access									
3. To analyse data for bias and	l credibility									
Expected Course Outcomes:										
On the successful completion of the course, student will be able to:										
1 Understand Data foundation.	generations, data formats, Data Evolution, I	Data fro	m	K1.]	K2					
various domains	various domains									
2 Understand Data privacy, eth	2 Understand Data privacy, ethics, importance of data ethics, Data security K3									
3 Understand Data Integrity, cr	redibility, Features and issues of data ethics	– ethica	ıl	K2						
use of data										
4 Understand the role of metada	ata management – Database security – access	s of		K2-ŀ	K5					
different data sources – Data Integration										
5 Analyze ethical toolkits, Platform, Design and Data model, and data analytics										
network, principle of AI ethic	S CONSTRUCTION	<u></u>		K6						
K1 - Remember; K2 - Understand;	K3 - Apply; K4 - Analyze; K5 - Evaluate; I	(6 – Cre	ate							
Inital Introduction to I	Data Exploration			10 h	01186					
Data foundation with data types a	nd structures - Data Collection - Data form	 nate _ T	vne	$\frac{10 \text{ n}}{2 \text{ of } d}$	ours					
Structured vs Unstructured – The	structure of data – Data pre-processing -	Check	data	on b	ias —					
credibility – privacy – ethics – pipe	eline of data access – extract – filter – sort da	ıta – Da	ita oi	ganizi	ing –					
protecting data - Data modelling t	echniques - Data Transformation - Data for	or explo	oratio	on —	Data					
analysis - Data design - Data gover	nance									
Unit:2 Data Risks and F	Privacy			12 h	ours					
Data access and analysis – Risk m	itigation – Risks, Harms and Benefit assessr	nent – S	Sensi	tive d	ata –					
transparency – Data accountability	- Data Retention - Data Minimization - Data $r_{\rm r}$ - Introduction to Data privacy - History of	ta Quan E privac	ty –	Open Degree	data					
privacy – Modern privacy risks –	Anonymity – Data validity – Choice of Attr	ibutes a	nd N	Aeasu	res –					
Errors in Data Processing – Errors	in Model Design – Algorithmic Fairness									
Unit:3 Data Ethics with U	nbiased and Objective Data			12 h	ours					
Data Ethics – the importance of da	ata ethics — Data anonymization – The eth	ical use	of	lata -	Data					
Science needs ethics - Data owned	ership – Data Integrity – Biased and Unbia	used dat	a –	Fairne	ess –					
$Accountability-Transparency\ \text{-}\ Data\ credibility-Data\ ethics\ and\ privacy-Data\ anonymization-The$										
ethical use of data - Ownership - key issues in Data ethics - Open data usage - Features and										
characteristics - Legal compatibility	y of fairness									

Unit	•4	Database	Security	y and An	alvtics					12 hours	
Rela	• tional date	bases - Da	tabase fe	anu An	Metadata	a _ Import	ance - Des	crintive and	structural	metadata	
-Scl	hemas - N	letadata m	anagemei	nt – Inter	mal and l	External so	$\frac{1}{2}$	mbine data -	– Data Int	egration -	
Acce	ess of diff	erent data s	ources –	sorting -	- filtering	g – Large d	latasets – B	ig Query –	organize a	nd secure	
data				U	L L	, 0			U		
Unit	:5	Ethics an	d Data P	Protection	n					12 hours	
Pers	sonal Dat	a definition	n – Trans	parency	– Anony	mization -	– Physical	and IT secu	rity – Pro	cedures –	
Pas	sing data	to third par	ty – Rec	eiving da	ata – org	anizing an	d protecting	g data – bal	ancing sec	curity and	
ana	lytics – D	ata protecti	ion – Pri	vacy law	s – Desig	gn privacy	– Principle	es – Compli	ance with	laws and	
stan	ndards – D	ata sharing	5								
Unit	:6	Contemp	orary Is	sues						2 hours	
Exp	ert lectur	es, online s	eminars -	– webina	rs						
						Total	Lecture ho	ours		60 hours	
Text	Book(s)										
1	G.E. Ker	inedy, Data	1 Privacy	Law A I	Practical	Guide to the	he GDPR, 2	2019			
2	Mike Loukides, Hilary Mason, DJ Patil, "Ethics and Data Science", O'REILLY Media, Inc., 2018.										
3	Journal Joseph, Data & Analytics 4.0, The future of work, Privacy and Trust in the Age of										
Defe	Artificial Intelligence, 2019.										
Reference Books											
1	Data Priv	acy, Ethics a	and Protect	ction Guid	lance note	e on Big Da	ita For Achie	evement of th	ne 2030 Ag	enda,	
	United IN	ations Devel	opinent C	лоцр			p.				
Rela	ted Onlir	e Content	s [MOO	C. SWA	YAM. N	PTEL. W	ebsites etc	.]			
			C	ourse Ti	tle			Duration	Provi	der	
1	Data Science Ethics 4 W							4 Weeks	Cours	era	
2	Prepare l	Data for Ex	ploration	1	1			4 Weeks	Cours	era	
3	Introduct	ion to data	ethics -	Bias, Cro	edibility,	privacy		4 Weeks	Cours	era	
4	Solve Bu	siness prob	olems wit	th AI and	l Machin	e Learning	5	4 Weeks	CNX		
Web	Links										
1	Tene, Or	ner and Pol	lonetsky,	Jules. "F	Privacy in	n the Age of	of Big Data	: A Time fo	r Big Dec	isions."	
	February	2, 2012. 6	4 Stan. L	. Rev. O	nline 63.	http://ww	w.stanfordl	awreview.o	rg/online/	privacy-	
	paradox/	big-data									
2	Noam,	Eli. "P	rivacy	and S	Self-Reg	ulation:	Markets	for Elec	ctronic	Privacy."	
	1997. htt	p://www.ci	ti.colum	bia.edu/e	elinoam/a	rticles/priv	v_self.htm				
3	Congress	sional Rese	arch Serv	vice, Dat	a Protect	ion Law: A	An overviev	w, March 25	5, 2019		
Map	ping wit	n Program	me Outo	comes						1	
Co	s PO	I PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO	l S	S	S	S	-	-	M	М	S	S	
CO2	2 S	S	S	M	M	M	S	S	S	M	
CO3	8 S	S	S	S	S	S	M	М	М	M	
CO4		S	S	S	M	M	M	-	-	M	
CO5	5 M	M	S	S	S	S	-	-	S	S	

Cou	rse code		PRACTICAL I : ALGORITHM LAB SC	AA D L	ATED T): 18.05.2 P	.023 C			
Core	/Elective/S	Supportive	Core			5	4			
Pr	e-requisit	te	Basic Programming language	Syl Ve	labus rsion	2023 Onwa	ards			
Cou	rse Objec	tives:	L							
The 1	main obje	ctives of this co	ourse are to:							
1.Tl 2.T vario 3. It	his course his course ous technic also enab	covers the bas enables the stu ques ple the students	ic data structures like Stack, Queue, Tree,List. udents to learn the applications of the data stru to understand the Algorithm Design Techniqu	ctures ies.	using					
Exne	ected Cou	rse Outcomes	•							
Or	the succe	essful completi	on of the course, student will be able to:							
1	Implem	ent data structu	ares like Stack, Queue, Tree, List using python			K4.K5				
2		K2,K3								
3	Implem	Implement Divide and Conquer technique for Sorting, Searching								
4		K3,K4,K	<5,K6							
K	K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create									
			LIST OF PROGRAMS			75 ho	ours			
2 3) Write a) Write a) Write a	program to pe program to pe program to so	erform various operations on stack. erform various operation in queue. lve the tower of Hanoi problem.							
4) Write a	program to so	rt an arra <mark>y of an elements using</mark> quick sort.							
5) Write a	program to sea	arch for an <mark>element in a tree u</mark> sing divide & co	nquer	strateg	gy.				
6) Write a	program to so	lve number of elements in ascending order usi	ng Me	erge so	rt				
7) Write a	program to so	lve the knapsack problem using greedy metho	d						
8) Write a	program to so	lve travelling salesmen problem							
9) Write a	program to pla	ace the 8 queens on an 8X8 matrix so that no t	wo qu	eens A	ttack.				
Ex	pert lectur	res, online sem	inars – webinars							
			Total Leo	ture l	nours	75 ho	ours			
Te	xt Books									
1	Goodrich	n, "Data Structu	ures & Algorithms in Java", Wiley 3rd edition.							
2	Skiena,"	The Algorithm	Design Manual", Second Edition, Springer, 2	008						
Re	ference B	ooks		11 F		71	<u> </u>			
1	AnanyLe 2003.	evith,"Introduct	tion to the Design and Analysis of algorithm	n", Pea	arson I	Education	iAsia,			
2	Robert Se Addison-V	dgewick,Philli Wesley Publish	pe Flajolet,"An Introduction to the Analysis ing Company,1996.	of A	lgorith	ms",				
Re	lated Onl	ine Contents [MOOC. SWAYAM NPTEL Websites etc.	1						
1	https://on	linecourses.np	tel.ac.in/noc19 cs48/preview	1						
2	https://nn	tel.ac.in/noc/co	ourses/noc16/SEM2/noc16-cs19/							
-	Po-//11P									

3	https://www.tutorialspoint.com/object	t_oriented_analysis_design/ooaC_object_offented8_affa2023
5	ysis.htm	

Course Designed By:

Mappin	Mapping with Programming Outcomes												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	S	S	М	S	-	-	L	-	-	L			
CO2	М	М	М	L	-	-	-	-	-	-			
CO3	S	S	М	S	-	-	L	М	-	S			
CO4	S	S	М	S	-	-	L	М	-	S			



Course code	PRACTICAL II : PYTHON IROGRAMMING LAB	L	Т	Р	C						
Core/Elective/Supportive	Core			5	4						
Pre-requisite	Basics of any OOPs Language	Sylla Vers	ibus sion	2023-	-2024						
Course Objectives:											
The main objectives of the	is course are to:										
1. This course presents	an overview of elementary data items, lists, die	ctionarie	s, set	s and tuj	ples						
2. To understand and v	vrite simple Python programs										
3. To Understand the OOPS concepts of Python											
4. To develop web app	mes:										
On the successful completion of the course, student will be able to:											
1 Understand and a	ble to write programs in Python using OOPS co	oncepts		K2,K3	3						
2 Implement lists, dictionaries, sets and tuples as programs											
3 Able to write programs using Python libraries											
4 Implement of Python libraries for Visualization											
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create											
LIST OF PROGRAMS 75 hours											
Implement the following in Python:											
1. Programs using	g elementary data items, lists, dictionaries and the	uples									
2. Programs using	g OOPS concepts										
3. Programs using	g Python lib <mark>rarie</mark> s (Numpy,Pan <mark>da)</mark>										
4. Programs using	g Tensorflow										
5. Programs using	g libraries for visualization(matplotlib, lineplot,	scatterpl	ot)								
	Total Lecture	hours		75 ho	ours						
Text Books	Stellange wash										
1 Bill Lubanovic, "In	troducing Python", O'Reilly, First Edition-Sec	ond Rele	ase, 2	2014.							
2 Mark Lutz, "Learni	ng Python", O'Reilly, Fifth Edition, 2013.										
Reference Books											
1 David M. Beaz FourthEdit	ley,"Python Essential Reference", Develo ion,2009.	oper's l	Libra	ry,							
2 SheetalTaneja,Nave Approach",Pearson	een Kumar,"Python Programming-AMoo Publications.	lular									
Related Online Conte	nts [MOOC, SWAYAM, NPTEL, Websites e	etc.]									
1 https://www.progra	miz.com/python-programming/										
2 https://www.tutoria	2 https://www.tutorialspoint.com/python/index.htm										
3 https://onlinecourse	s.swayam2.ac.in/aic20_sp33/preview										

Mappir	Mapping with Programming Outcomes												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	S	S	S	S	-	L	L	L	-	L			
CO2	S	S	S	М	-	L	L	-	-	L			
CO3	S	S	S	М	-	М	L	L	-	L			
CO4	S	S	S	S	-	М	L	L	-	L			

			ADVANCED DATABASE MANAGEMENT SYSTEMS	L	T	P	С				
Core	/Electiv	e/Supportive	Core	4			4				
Pre	-requis	ite	Nil	Syllabu Version	s	2023 2024	-				
Cou	rse Obj	ectives:				-					
The	main oł	pjectives of this con	urse are to:								
 To understand the concepts of DBMS, Data Model and Normal forms. To understand the concepts of concurrency control and Recovery. To understand basics of SQL and NoSQL databases. To understand and apply MongoDB (NoSQL) for Data Analysis using CURD and User Management, and to impart knowledge on Graph Databases 											
F		0									
Expe	the suc	ourse Outcomes:	of the course, student will be able to:								
1	Linde	ressiul completion	e and model of the relational database manageme	ont cycto	me	ĸ	$\tilde{\boldsymbol{\gamma}}$				
2 Understand the concepts of transaction management and SOL NoSOL database											
models											
3 Understand and create database models using MongoDB and Graph Database K4											
4 Apply MongoDB operators to retrieve data from document data stores											
5	5 Understand and apply concepts of data management indexing techniques for K5.										
	speci	fic applications		•		K	6				
K1	- Reme	mber; K2 - Under	stand; <mark>K3</mark> - Apply; K4 - Analyze; K5 - Evaluate	e; K6 – (Crea	ate					
			Transferrar and Caller St.								
Uni	it:1	Database Overvi	ew		1	0 hou	ırs				
Intro	duction	- Database conce	epts, Basic components of DBMS, sources of	data - d	ata	mode	ls –				
hiera	rchical	- network - XML	and Stores - Relational Database Design: Anor	nalies ir	n a l	Databa	ise-				
Func	tional	Dependency – Lo	ssless Join and Dependency – Preserving De	composi	itio	1 – T	hird				
Norn	nal For	m–Boyce Codd No	ormal Form – Multi-valued Dependency – Fourth	h Norma	l Fo	orm –	Join				
Depe	endency	– Project Join Noi	rmal Form – Domain Key Normal Form - SQL: L	Data Def	initi	lon - I	Jata				
Man	ipulatio	n – Integrity Cons	traints-views-PL/SQL.								
Um	4.7	NoSOI			1) has					
Index	ving on	d Hashing Quer	y Processing Transaction Processing Con	nirrancy		2 not	and				
Indexing and Hashing – Query Processing – Transaction Processing – Concurrency Control and Recovery - Advanced Database Concepts and Emerging Applications: Distributed Databases – Object Oriented Databases - Object Relational Databases- SQL–NoSQL Tradeoffs–CAP Theorem– Eventual Consistency - NoSQL–database types – Document Oriented – Columnar – Graph – Key- Value Pair - NoSQL database, design for performance / quality parameters, documents and information retrieval.											
Uni	it•3	MongoDR Introd	luction		1	2 hor	irc				
Mon	onDR-	Introduction – Mo	ngoDB – Need – MongoDB Vs RDRMS – M	 OngoDR	1 N_1						
Serve	MongoDB- Introduction – MongoDB – Need – MongoDB Vs. RDBMS – MongoDB - MongoDB Server Configuration Import and Export – Data Extraction Fundamentals – Intro to Tabular										
Form	nats - P	arsing CSV - Par	sing XLS with XLRD-Parsing XML - Intro to	JSON	- N	Iongol	DB-				
CUR	D Oper	rations – MongoDl	B Operators - Query Document - Pipeline - Agg	regation	Op	erator	'S -				

		M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affili	ated Colleg	es - Ar	inexure No.290				
Unit	:4	Advanced MongoDB	SCA	A DAT	ED128000000000000000000000000000000000000				
User N	Manag	ement – MongoDB Data Replication in Servers – Data	Sharding –	Mongo	DB Indexes –				
Create	e – Fir	nd – Drop – Backup – MongoDB – Relationships – A	Analyzing (Queries	– MongoDB				
Object	tid – A	dvanced MongoDB: MapReduce – MongoDB - Text P	rocessing -	Regula	ar Expression.				
Unit	: 5	Graph Database			12 hours				
Introd	uction	to graphs – Graph Database – Indexes – Graph – Node	es – Proper	ties –R	elationships –				
Traver	rsal –	Path - Graph Compute Engines - The power of gr	aph databa	ses –P	erformance –				
Flexib	oility –	Agility - Graph Data Modeling – Types of Graphs –	Non directe	ed grap	bhs – Directed				
Graph	is – W	eighted Graphs - Labeled Property - Graph Model -	- Querying	Graph	s – Cypher –				
Comp	arison	of Relational and Graph Modeling – Building grap	h database	applic	ation –Graph				
storag	e data	bases – Graph store –: Neo4j – Hyperbase – DB – Info	Grid -Graph	is in the	e real world.				
Unit	:6	Contemporary Issues			2 hours				
Exper	t lectu	res, online seminars – webinars							
		,							
		Total Lectur	re hours		60 hours				
Text I	Book(s	5)							
1	A 1			<u> </u>	4 22 7th				
-	Abra editio	ham Silberchatz, Henry K.Forth, Sudharshan, "Databa on, McGraw Hill, 2020.	se system (Concep	ots", /"				
2	Prab	u C.S.R, "Object-Oriented Database Systems: Appro	aches and	Archit	ectures"				
	3 ^{ra} E	dition, PHI, 2011.							
3	Kris ISB	stina Chodorow , "MongoDB: The Definitive Guide" , N: 9781491954461, 201 <mark>9</mark> .	3 rd Edition	, O'Re	eilly Media,				
4	Gu	y Harrison, "Next Generation Databases: NoSQL, No	ewSQL, an	d Big					
	Dat	a ",Apress, 2016.		0					
Refer	ence E	Books :EBooks							
1	Sha Pea	mkantB.Navathe, RamezElamsri" Fundamentals of D a rson Education Limited, 2017.	atabase Sys	stems"	, 7 th Edition,				
2	Dav	id Hows, Peter Membrey, EelcoPlugge, Timm Hawk	tins , "The	Definit	tive Guide				
	to N	JongoDB ", 3 rd Edition, Apress, 2015.	,						
3	Gaur	avVaish ,"Getting Started with NoSQL"Packt Publisl	hing, 2013.						
4	Ian F	Robinson, Jim Webber & amp: Emil Eifrem, "Graph Data	abases New	v Oppor	rtunities for				
	Conr	nected Data" 2 nd Edition O'Reilly publication		11					
Relate	ed On	line Contents [MOOC, SWAYAM, NPTEL, Website	es etc.]						
		Course Title	Duratio	n	Provider				
1.	Data	base Management System	12 Weeks		Swayam				
2.	Data	base Management System	8 Weeks		NPTEL				
3	NoSOL Systems 4 Weeks Court								
4	Intro	duction to MongoDB	3 Weeks		Coursera				
The interview of the in									
1	httne•/	/www.w3schools.in/dbms/							
 https://www.wosenoois.ii/doilis/ https://www.guru99.com/nosal_tutorial.html 									
3	<u>2. https://www.guru99.com/nosqr-tutofial.ntmin</u> <u>3 https://www.tutorialspoint.com/mongodb/index.htm</u>								
Cour	rse De	signed hv: Dr S Gayackar							
Coul		ngnou oy. Di Di Oavashai							

Mappi	ng with	Program		SCAA DATED: 18.05.2023						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	М	S	М	М	М	М	L	S
CO3	S	М	М	S	М	М	L	М	L	М
CO3	S	Μ	М	S	М	Μ	L	М	L	М
CO4	S	М	S	S	М	S	L	М	L	S
CO5	S	М	S	М	М	М	М	М	L	S

M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affiliated Colleges - Annexure No.29C



		MATHEMATICAL FOUNDATIONS BORA		ED: 1 T	18.05 P	.2023 C			
~		MACHINE LEARNING		ļ					
Cor	e/Elective/Supportive	Core	4	<u> </u>		4			
Pro	e-requisite	Nil	Sylla Versi	bus ion		2023- 2024			
Cou	rse Objectives:								
The	main objectives of this c	course are to:							
	1 To understand line	or programming matheda							
	2. To understand Dy	namic programming approach.							
	3. To understand con	cepts basics concepts of Linear Algebra							
	4. To understand con	ncepts of vector spaces and matrices							
	5. To understand the	applications of Linear Algebra in Machine Learnin	g						
I.									
Exp	the survey of a low multi-								
	the successful completion	on of the course, student will be able to:	11		17/	<u></u>			
1	Solve linear programm	ing techniques to optimization problems arising in	all		KS	\$			
2									
2	Understand the basics	of Linear Programming constructs			K	<u>,</u>			
 	Apply vector spaces ar	ad their applications in Machine Learning				2			
-	Understand the concer	ts of matrix Gaussian Elimination and differential	equati	ons	K) K5			
5	and Apply the concept	s of Linear Algebra in Machine Learning Algorithm	oquati 18	0115	112	-, 13			
K1	- Remember; K2 - Und	erstand; K3 - Apply; K4 - Analyze; K5 - Evaluate;	K6 –	Creat	te				
Un	it:1 Linear Program	nming P <mark>robl</mark> em			12	hours			
Intro	oduction to Operations	Research: Basics definition - scope - objective	s - ph	ases	- m	odels -			
limi	tations of Operations Re	esearch - L <mark>inear Programming P</mark> roblem - Formulat	ion of	LPP	- Gr	raphical			
solu	tion of LPP - Simplex	Method - Artificial variables - Big-M method -	- Two	-phas	se m	ethod -			
Deg	eneracy - Unbounded so	lutions- Duality in Linear Programming Problems -	– Dual	Sim	plex				
		ADDEATE TO LLAND							
Un	it:2 Dynamic Progr	amming			12	hours			
Dyn	amic Programming -	Introduction - Characteristics of dynamic prog	gramm	ing	– D	ynamic			
prog	gramming approach for P	fority Management employment smoothening – ca	ipital c	uage	ung	– Stage			
Coa	cii/Siloitest Patii – cargo	loading and Kenabinty problems.							
Un	it·3 Geometry Lines	or Faustions and Vector Spaces			12	hours			
The	Geometry of Linear Equ	ations - An Example of Gaussian Elimination- Mate	iv Not	tation	and	Matrix			
Mul	tiplication - Triangular F	Factors and Row Exchanges- Inverses and Transpos	les	anon	i and	Widulix			
Vec	tor Spaces and Subspace	s - Solving Ax=0 and Ax=b - Linear Independence	Basis	and	Dim	ension-			
The	Four Fundamental Subs	paces- Graphs and Networks- Linear Transformation	ons.		2	••••••			
_									
Un	it:4 Determinants, E	Cigen values and Eigenvectors			12	hours			
Dete	erminants: Introduction	- Properties of the Determinant- Formulas fo	r the	Det	ermi	nant –			
App	lications of Determinar	nts. Eigen values and Eigenvectors: Introduction-	Diag	onali	izatic	on of a			
Mat	rix Difference Equation	ons and Powers A k- Differential Equations and e A	t - Co	mple	ex M	atrices-			
Sim	ilarity Transformations -	- A - Applications of Machine Learning – Use case	s						

	M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affiliated Colleges - Annexure No.29C								
Unit	:5	Positive Definite Matrices	SCAA	DATED: 181.005h20023					
Minin	na, N	Iaxima, and Saddle Points - Tests for Positive Definit	teness - Singular	Value Decomposition					
– Mac	chine	Learning Applications – Use cases.							
Unit	:6	Contemporary Issues		2 hours					
Ucol	inaa	and Dynamia programming approach to real time pr	oblama Apply th	a concents of Lincor					
Alsolves in Mashing Learning Alsovithms									
Algeb	ra m	Machine Learning Algorithms							
Exper	t lect	tures, online seminars – webinars							
	Total Lecture hours 60 hours								
Text I	Book	a(s)							
1 J K Sharma, "Operations Research Theory & Applications" 6 th Edition, Laxmi									
	Put	plications, 2017.							
2	Gil	bert Strang, Linear Algebra and Its Application, 5 th	Edition, Welles	ley Cambridge					
	Pre	ss, ISBN: 9780980232776, 2017.							
Pofor	onco	Books · FRooks							
1	D	K Cupto and D S. Hiro "Operations Descenab" S.	Chand & ap 20)17					
1	г. р	K. Oupla and D. S. Hila, Operations Research , S.)1 / I.4					
2		avid C. Lay, Steven R. Lay, Judi J. McDonaid, "Line	ar Algebra and	its Applications" 5"					
D 1 (EC	lition, Pearson Education, 2016.	•						
Relate	ed O	nline Contents [MOOC, SWAYAM, NPTEL, Wet	osites etc.]						
		Course Title	Duration	Provider					
1.	Op	erations Research	15 Weeks	Swayam					
2.	Lin	ear Algebra	12 Weeks	Swayam					
Web l	ink								
1.	htt	os://stemez.com/subjects/science/1HOperationsResea	ch/1HOperations	Reseach.php					
2.	httr	os://www.khanacademy.org/math/linear-algebra							

Mappi	Mapping with Programme Outcomes											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	М	S	М	М	Μ	S	S	М	S		
CO2	S	S	S	S	М	Μ	S	S	М	S		
CO3	Μ	М	Μ	S	S	Μ	М	S	L	S		
CO4	S	М	S	S	S	Μ	S	S	L	S		
CO5	М	М	М	S	S	Μ	М	S	L	S		

Carling to Links

Core	e/Elective/Supportive	Core S	CAA DATED:	18.05.2023				
Pre-	requisite	Nil	Syllabus	2023-				
			Version	2024				
Cou	rse Objectives:							
The 1	To understand the concer	urse are to: ts of Data Warehouse architecture and apply	for various dor	naine				
2.	To understand Data Minin	is of Data Watchouse architecture and apprying techniques Cluster. Classification and Ass	ociation Rule M	lining.				
3.	To understand the concep	ts of Web mining, Text mining and Spatial m	nining.	6				
Exp	ected Course Outcomes:							
On t	he successful completion	of the course, student will be able to:						
1	Understand Data wareho	using architecture and process.		K2				
2 Apply the mining techniques like association, classification and clustering on								
	datasets			<u> </u>				
3 Understand the visualization package R								
4	Analyse the data set to u	nderstand the issues in the real world problem	1	K4,K5				
		·		K6				
5 Apply the statistical measures in K								
KI -	Remember; K 2 - Unders	and; K3 - Apply; K4 - Analyze; K5 - Evalua	le; Ko – Creale					
Unit	•1 Data Wareho	ising		8 hours				
Data	Warehouse -Introduction	on - Multidimensional data model - OLAP	operations - W	/arehouse				
sche	ma - Data warehousing arc	chitecture - Warehouse Schema - Warehouse s	erver - Meta dat	a - OLAP				
Engi	ine - Data warehouse back	end process - Data Warehouse Technology -	Warehousing S	oftware -				
Clou	d data warehousing. Data	Warehousing Case Study: Government, Tour	rism and Industr	ïy.				
				101				
Unit	Data Mining			12 hours				
Data	a Mining: Introduction –	Data as a Subject - Definitions- KDD vs. Data	ata mining- Dat	a Mining				
Asso	niques-Current Trends in	Data Mining. Association Rules: Concept	s- Methods to	discover				
	staring: Data Attribute T	Vinum.	- Clustering na	radiams				
Parti	tion algorithm-K-Means a	lgorithm	- Clustering pa	radigins-				
Clas	sification: Introduction -	- Decision Trees: Tree Construction Princir	ole – Attribute	Selection				
mea	sure – Tree Pruning - Deci	sion Tree construction Algorithm – CART –	ID3.					
	0	6						
Unit	Exploratory I	Data Analytics: Visualization Package R		14 hours				
Intr	oduction - Overview and	History of R - Data Types - R Objects an	d Attributes -	Vectors -				
Rem	oving Missing Values-C	ombining Variables - Vectorized Operatio	ns – Apply() f	family -				
Clea	ning Data: – Exploring R	aw Data - Visualising Distributions - Typical	Values - Unusua	al Values-				
Miss	sing Values: Zeros And Na	s - Filling Missing Values – Data Manipulation	on using dplyr()	package-				
Visu	alization Packages – Une	lerstanding Plots - Aesthetics - Lattice – Ggp	olot2 – Plotly - U	Jnivariate				
Visu	Visualization: Histogram – Box Plot- Bar Chart - Multivariate Visualizations: Scatter Plot- Heat Map-							
Rep	orts & Dashboards: Rma	arkdown Package - Dashboards: Flex Dashbo	oard: Layout: R	ow-based				
layo	uts - Attributes on sections	- Multiple pages - Story boards - Component	s: Value boxes -	-Gauges-				
Text	annotations - Navigation	bar – Shiny Web App: Introduction Shiny - L	ayout - Control	widgets-				
Read	ctive output - R scripts and	Data - Reactive expressions – App Deploym	ient.					

Unit:4 Data Insights

Data Insights: Data types – Categorical – Binary – ordinal – Nominal –**SCONTIDUATED DISCOET2023** Data Dimensions –Numerical Measures – Central Tendency – Mean – Median – Mode – Understanding data using central tendency – plotting histogram – density plots and inference of plot - Variability Measure – Variance - Range - IQC - and Standard Deviation – Sum of squares – Squared Deviations – Absolute Deviations - Identify outlier using Inter Quartile Range – Visualization using boxplot

Unit	2:5 Data Distribution 12 hours							
Data	a Distribution: Data standardizing – Z Score – Negative Z Score - Normalized Distribution-							
Prob	ability Distributions - Probability of mean - location of mean distribution - Sampling							
Dist	ributions — Standard Error - Standard Deviation of sampling distribution – Ratio of Sampling							
Dist	ribution - Regression Analysis - Logistic Regression - Multiple Regression - ANNOVA Model							
– Pa	rametric test - Non-Parametric Test							
Unit	:6 Contemporary Issues 2 hours							
Wr	ite an assignment on any one of the following:							
An	alyze Global Datasets to understand Issues on Climate Change, Epidemic and Pandemic Outburst							
	Total Lecture hours 60 hours							
Text	t Book(s)							
1	Jiawei Han, MichelineKamber, "Data Mining Concepts and Techniques", Morgan							
	Kaufmann Publishers, 2012							
2	Pieter Adriaans, DolfZantinge, "Data Mining", Addison Wesley, 2008.							
3	Krzyszlof J Cios, WitoldPedrycz, "Data Mining: A Knowledge Discovery Approach", Springer,							
	2010.							
4	V. Bhuvaneswari, "Data Analytics with R – Step by Step", SciTech Publications, 2016.							
5	Roger D. Peng, "R Programming for Data Science" Lean Publishing, 2014							
6	Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters,"A Beginner's Guide to R" Springer,							
	2009							
7	Hadley Wickham, "R for Data Science: Import, Tidy, Transform, Visualize, and Model							
	Data", First Edition, O'Reilly Media Publisher, ISBN: 9781491910399, 2017							
	Shelly month & water							
Dofe	aranga Rooks							
Neit								
1	Arun K Pujari, "Data Mining Techniques", Universities Press. 2012							
2	ArijayChaudhry, Dr. P .S Deshpande, "Multidimensional Data Analysis and Data Mining",							
	Dreamtech press, 2009.							
3	Brett Lantz, "Machine Learning with R", Third Edition, ISBN: 9781788295864, 2019,							
	[Packt]							
4	Kaelen Medeiros, " R Programming Fundamentals ", ISBN: 9781789612998, 2018, [Packt]							
5	VitorBinanchiLanzetta, "Hands-On Data Science with R", ISBN: 9781789139402, 2018,							
	[Packt]							
6	Omar Trejo Navarro, " R Programming by Example ", ISBN: 9781788292542, 2017, [Packt]							
7	Jared P. Lander, "R for Everyone: Advanced Analytics and Graphics", Second Edition, Pearson Education Publisher, ISBN: 9789386873521, 2018							
8	VigneshPrajapati, "Big Data Analytics with R and Hadoop", First Edition, PACKT							
	Publishing Limited, ISBN: 9781782163282, 2013							
0								
9	ISBN: 9789351194378, 2014							

10	Had	ley Wickham, "Advanced R", Second Edition, (CRC Publisher\$ (I\$BND978E08 1 \$884520 2
	2019	9	
Rela	ated (Online Contents [MOOC, SWAYAM, NPTEL,	Websites etc.]
	1.	Data Visualization	4 Weeks
	2.	Text Retrieval and Search Engines	6 Weeks
	3.	Text Mining and Analysis	6 Weeks
	4.	Pattern Discovery in Data Mining	4 Weeks
	5.	Cluster Analysis in Data Mining	4 Weeks
	6.	Data Mining Project	6 Weeks
	7.	R Programming	4 Weeks
	8.	Data Analysis with R	8 Weeks
	9.	Introduction to Data Analytics	9 Weeks
	10.	Introduction to R Software	9 Weeks

Web Link

- 1. http://www.celta.paris-sorbonne.fr/anasem/papers/miscelanea/InteractiveDataMining.pdf
- 2. https://www.javatpoint.com/data-mining-world-wide-web
- ${\tt 3. https://www.peterindia.net/DataMiningLinks.html}$
- 4. https://www.datacamp.com/tracks/r-programming
- 5. https://www.tutorialspoint.com/r/index.htm
- 6. https://www.datamentor.io/r-programming/

Course Designed By: Prof. Dr. V. Bhuvaneswari

Mappi	ng with	Program	nme Out	comes	(milden)					
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	RAPTILAS	М	1	Μ	-	М
CO2	S	S	S	S	-	S	S	М	-	М
CO3	S	S	S	S	S	М	S	L	-	L
CO4	S	S	S	S	S	S	S	S	М	S
CO5	S	S	S	S	М	Μ	S	М	-	S

Course Code		DATA VISUALIZATION	SCAA I): 18 F	05 P	.2023 C				
Core/Elect	ive/Supportive	Core		4			4				
Dro rogu	isito	NI:I	5	Syllabu	15	202	23-				
TTe-Tequ		111		Versio	n	202	:4				
Course O	bjectives:										
The main of	objectives of this co	burse are to:									
1. T	o understand how a	ccurately represent voluminous complex of	lata set in	web a	nd fr	om					
other data	sources.										
2. T	o understand the m	ethodologies used to visualize large data so	ets								
5.1		k with visualization tools.									
Expected	Expected Course Outcomes:										
On the su	ccessful completio	n of the course, student will be able to:									
1 Understand the concepts of visualization											
2 Uno	derstand the metho	ds for visualizing data in D3i, c3i, and Tab	leau			K1	. K2				
3 Apr	oly Visualization m	ethods for different data domains				K4	,				
4 Des	sign Interactive Cha	urts based on Data				K3					
5 Dis	tinguish and Sugge	st the appropriate data visualization tools fo	or domain	specifi	c	K4,	, K5				
app	lications and Desig	n an Interactive data visualization story bo	bard for da	ata							
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create											
Ilmit.1											
Definition	Unit:1 Introduction to Data Visualization 12 nours										
Tools. Vis	ualizing Data: M	apping Data onto Aesthetics – Visualizati	zing Am	ounts	- V	isua	alizing				
Distributio	ons: Histograms a	nd Density Plots – Visualizing I	Propositio	ons: –	- V	isua	alizing				
Associatio	ns: Among Two o	r More Quantitative Variables – Visual	izing Tir	ne Ser	ies a	ınd	Other				
Functions	of an Independent	Variable – Trends – Visualizing Geospatia	l Data.								
Unit:2	Interactive Da	a Visualization			1	2 h	iours				
Introductio	on to D3 - Fundame	ental Technology: The Web – HTML – DC	DM – CSS	– Java	Scri	pt –	SVG.				
D3 Setup	- Generating Page	Elements - Binding Data - Drawing wit	h data –	Scales:	Dor	nai	ns and				
Ranges – N	Normalization – Cre	eating a Scale – Scaling the Scatter $Plot – O$	ther Meth	ods and	d Oth	ner S	Scales.				
Axes – Mo	odernizing the Char	t – Update the Data – Transition – Update	s – Intera	ctivity.							
TI 14 0	D2 D 1 D				1	<u>- 1</u>					
Unit:3	Do Based Keus	able Chart Library	vol Arrig	Show		$\frac{2}{1}$	obal				
Change Cl	art Type – Format	Values – Size – Color – Padding – Toolti	n. Use AF	- Snow PIs: Loa	ad ar	is L nd I	Inload				
– Show an	d Hide – Focus – T	ransform – Groups – Grid – Regions – Flo	-Rev	ert – To	oggle	e –L	Legend				
– Sub char	t – Zoom – Resize.	Customize Style. Building Real time and I	Live Upda	ating an	nimat	ted	graphs				
with C3.											
Unit:4	Data Visualiza	tion Tools : Tableau			1	2 h	iours				
Environme	ent Setup – Navigat	ion – File & Data Types. TA SOURCE: C	Custom Da	ata Viev	w – I	Exti	acting				
Data – Fiel	Data – Fields Operations – Editing Meta Data – Data Joining – Data Blending. Worksheets Bar Chart										
- Line Cha	- Line Unart - Pie Chart - Scatter Plot - Bubble Chart - Gantt Chart - Histograms - Waterfall Charts.										
Dashooafd	i – Formatting – Fo	recasting – riend Lines – Cleaning Dasho	Jaiu								
Unit:5	Power BI				1	10 h	iours				
		Page 27 of 57									

Power BI Features – Data Slicers – Data Transformation- Field Aggregation A Transformation before Load – Formatting Currecy –transforming Columns – Mapping map with GIS – Filtering – Visualizing – Creating Dashboard (Specific Usecase or Dataset) – Publishing to Web

Apply Visualization methods for different domains. Expert lectures, online seminars – webinars Total Lecture hours 60 hours Text Book(s) 60 hours I Ben Fry, "Visualizing Data: Exploring and Explaining Data with the Processing Environment", O'Reilly, 1st Edition, 2008. 60 hours 2 Scott Murray, "Interactive data visualization for the web: An Introduction to Designing with D3", O'Reilly, 2st Edition, 2017. 70 Second	Unit:6		Contemp	orary Is	sues						2 hours	
Total Lecture hours 60 hours Text Book(s) I Ben Fry, "Visualizing Data: Exploring and Explaining Data with the Processing Environment", O'Reilly, 1 st Edition, 2008. 2 Scott Murray, "Interactive data visualization for the web: An Introduction to Designing with D3", O'Reilly, 2 ^{sul} Edition, 2017. 3 Joshua N. Milligan, "Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics", Pack Publishing Limited, 2019. 4 Claus O. Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures", O.Reilly, 2019. 5 Dan Clark, Beginning Microsoft Power BI: A Practical Guide to Self-Service Data Analytics , 22 February 2020 Reference Books :EBooks I 1 Ritchie S. King, "Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript", Addison-wesley Data and Analytics , 2014. 2 Elijah Meeks, "Dajs in Action: Data visualization with JavaScript", Second Edition, Manning Publications, 2017. 3 Lindy Ryan, "Visual Data Storytelling with Tableau". 1st Edition, Pearson, 2018. I Fundamentals of Visualization with Tableau 4 Weeks 1. https://c3js.org/gettingstarted.html 2. https://www.udacity.com/table-of-contents 4. https://www.udacity.com/tableav/index.htm 3.	Apply V	isualiz	zation me	thods for	r differer	nt domaiı	ns. Exper	t lecture	s, online	seminars	– webinars	
Total Lecture hours 60 hours Text Book(s) I Ben Fry, "Visualizing Data: Exploring and Explaining Data with the Processing Environment", O'Reilly, 1st Edition, 2008. 2 Scott Murray, "Interactive data visualization for the web: An Introduction to Designing with D3", O'Reilly, 2st Edition, 2017. 3 3 Joshua N. Milligan, "Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics", Packt Publishing Limited, 2019. 4 4 Claus O. Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures", O.Reilly, 2019. 5 5 Dan Clark, Beginning Microsoft Power BI: A Practical Guide to Self-Service Data Analytics , 22 February 2020 7 8 Ritchie S. King, "Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript", Addison-wesley Data and Analytics , 2014. 7 2 Elijah Meeks, "Data Storytelling with Tableau", 1st Edition, Pearson, 2018. 7 3 Lindy Ryan, "Visual Data Storytelling with Tableau", 1st Edition, Pearson, 2018. 7 1 Fundamentals of Visualization with Tableau 4 Weeks Coursera Web link 1 Https://www.udaity.com-Data Visualization and D3.J 5 1. https://www.udaity.com-Data Visualization and D3.J 5 Mappin												
Text Book(s) 1 Ben Fry, "Visualizing Data: Exploring and Explaining Data with the Processing Environment", O'Reilly, 1 st Edition, 2008. 2 Scott Murray, "Interactive data visualization for the web: An Introduction to Designing with D3", O'Reilly, 2 nd Edition, 2017. 3 Joshua N. Milligan, "Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics", Packt Publishing Limited, 2019. 4 Claus O. Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures", O.Reilly, 2019. 5 Dan Clark, Beginning Microsoft Power BI: A Practical Guide to Self-Service Data Analytics , 22 February 2020 8 Ritchie S. King, "Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript", Addison-wesley Data and Analytics, 2014. 2 Elijah Meeks, "D3.js in Action: Data visualization with JavaScript", Second Edition, Manning Publications, 2017. 3 Lindy Ryan, "Visual Data Storytelling with Tableau", 1st Edition, Pearson, 2018. Veb link Uuration 1 Fundamentals of Visualization with Tableau 2 https://www.dashingd3js.com/tableau/index.htm 3 https://www.dashingd3js.com/tableau/index.htm 4 Weeks 5 Nathingd3js.com/tableau/index.htm 5 htttps://www.dashingd3js.com/tableau/index.htm <tr< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>Tot</td><td>al Lectu</td><td>re hours</td><td>5</td><td>60 hours</td></tr<>							Tot	al Lectu	re hours	5	60 hours	
1 Ben Fry, "Visualizing Data: Exploring and Explaining Data with the Processing Environment", O'Reilly, 1 st Edition, 2008. 2 Scott Murray, "Interactive data visualization for the web: An Introduction to Designing with D3", O'Reilly, 2 nd Edition, 2017. 3 Joshua N. Milligan, "Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics", Packt Publishing Limited, 2019. 4 Claus O. Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures", O.Reilly, 2019. 5 Dan Clark, Beginning Microsoft Power BI: A Practical Guide to Self-Service Data Analytics , 22 February 2020 8 Ritchie S. King, "Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript", Addison-wesley Data and Analytics, 2014. 2 Elijah Meeks, "D3.js in Action: Data visualization with JavaScript", Second Edition, Manning Publications, 2017. 3 Lindy Ryan, "Visual Data Storytelling with Tableau", 1st Edition, Pearson, 2018. Veb link Vourse Title Duration 1 Fundamentals of Visualization with Tableau", 1st Edition, Pearson, 2018. 2 https://www.dashingd3js.com/table-of-contents 4 Weeks 3 https://www.dashingd3js.com/table-of-contents 4 https://www.dashingd3js.com/table-of-contents 5 https://www.dashingd3js.com/table-of-contents 6	Text Boo	ok(s)										
Environment", O'Reilly, 1 st Edition, 2008. 2 Scott Murray, "Interactive data visualization for the web: An Introduction to Designing with D3", O'Reilly, 2 nd Edition, 2017. 3 Joshua N. Milligan, "Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics", Packt Publishing Limited, 2019. 4 Claus O. Wilk, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures", O.Reilly, 2019. 5 Dan Clark, Beginning Microsoft Power BI: A Practical Guide to Self-Service Data Analytics , 22 February 2020 Reference Books :EBooks 1 1 Ritchie S. King, "Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript", Addison-wesley Data and Analytics, 2014. 2 Elijah Meeks, "D3.js in Action: Data visualization with JavaScript", Second Edition, Manning Publications, 2017. 3 Lindy Ryan, "Visual Data Storytelling with Tableau", 1st Edition, Pearson, 2018. Veb link 4 Weeks 1. https://c3js.org/gettingstarted.html 2. https://www.utorialspoint.com/tableau/index.htm 3. https://www.utorialspoint.com/tableau/index.htm 3. https://www.utorialspoint.com/tableau/index.htm 3. https://www.dashingd3js.com/table-of-contents 4. https://www.dashingd3js.com/tableau/index.htm	1 Be	n Fry,	"Visuali	zing Da	ta: Expl	oring an	d Explai	ining Da	ta with t	the Proce	essing	
2 Scott Murray, "Interactive data visualization for the web: An Introduction to Designing with D3", O'Reilly, 2 nd Edition, 2017. 3 Joshua N. Milligan, "Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics", Packt Publishing Limited, 2019. 4 Claus O. Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compeling Figures", O.Reilly, 2019. 5 Dan Clark, Beginning Microsoft Power B1: A Practical Guide to Self-Service Data Analytics , 22 February 2020 Reference Books :EBooks 1 Ritchie S. King, "Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript", Addison-wesley Data and Analytics, 2014. 2 Elijah Meeks, "D3.js in Action: Data visualization with JavaScript", Second Edition, Manning Publications, 2017. 3 Lindy Ryan, "Visual Data Storytelling with Tableau", 1st Edition, Pearson, 2018. Course Title 1 Fundamentals of Visualization with Tableau 1. Fundamentals of Visualization with Tableau 2 Lindy Ryan, "Visual Data Storytelling with Tableau", 1st Edition, Pearson, 2018. Veb link 1. Fundamentals of Visualization with Tableau 2. https://www.udacity.com/tableau/index.htm 3. https://www.udacity.com/tableau/index.htm 3. https://www	En	viron	ment", C	P'Reilly,	1 st Editio	on, 2008.						
with D3", O'Reilly, 2 nd Edition, 2017. 3 Joshua N. Milligan, "Learning Tableau 2019: Tools for Business Intelligence, data prep, and visual analytics", Packt Publishing Limited, 2019. 4 Claus O. Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures". O.Reilly, 2019. 5 Dan Clark, Beginning Microsoft Power BI: A Practical Guide to Self-Service Data Analytics , 22 February 2020 Reference Books :EBooks I 1 Ritchie S. King, "Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript", Addison-wesley Data and Analytics, 2014. 2 Elijah Meeks, "D3.js in Action: Data visualization with JavaScript", Second Edition, Manning Publications, 2017. 3 Lindy Ryan, "Visual Data Storytelling with Tableau", 1st Edition, Pearson, 2018. Veb link Visualization with Tableau 1. Fundamentals of Visualization with Tableau 2. https://c3js.org/gettingstarted.html 3. https://www.tutorialspoint.com/tableau/index.htm 3. https://www.dashingd3js.com/table-of-contents 4. https://data-flair.training/blogs/power-bi-tutorial/ Course Designed by: Dr. S. Gavaskar Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] Mapping with Programme Outcomes Cos PO1 PO3 PO6<	2 Sco	ott Mu	irray, "In	teractiv	e data vi	isualizat	ion for t	he web:	An Intro	oduction	to Designing	
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Course code	PRACTICAL III : DATA ANALYTICS WITH R LAB	L	Т	Р	С	
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Core/Elective/Supportive	Core	SCAA DATI	ED518.05.202
Pre-requisite	Basics of statistical Concepts and Algebra	Syllabus Version	2023-2024
Course Objectives:	•		
1. To enable the	e students to learn the visualization package R	Гool.	
2. To understan	d & write programs using the DM algorithms		
3. To apply stat	istical interpretations for the solutions		
4. Able to use v	isualizations techniques for interpretations		
Expected Course Outco	mes:		
On the successful comp	bletion of the course, student will be able to:		
1 Able to write program	ns using R Tool.	K	K1,K2
2 To implement Packag	ges and functions in R	К	K2, K3
3 Able to use different	visualizations techniques using R	К	X3,K4
4 To apply different da	ta mining algorithms to solve real world applic	ations K	K6, K6
K1 - Remember; K2 - U	Understand; K3 - Apply; K4 - Analyze; K5 - E	valuate; K6 –	Create
	LIST OF PROGRAMS		75 hours
 6. Implement Apriori 7. Data Visualization 	algorithm to extract association rule of datamin	ing.	
Expert lectures, online	seminars – webinars		
	Total Lecture	hours	75 hours
Text Book(s)		I	
V. Bhuvaneswari, "I	Data Analytics with R – Step by Step", SciTe	ch Publication	ns, 2016.
Roger D. Peng, " R F	Programming for Data Science" Lean Publish	ing, 2014	
3 Alain F. Zuur, Elena 2009	N. Ieno, Erik H.W.G. Meesters,"A Beginner's	s Guide to R'	' Springer,
Hadley Wickham, "F	R for Data Science: Import, Tidy, Transform	, Visualize, a	nd Model
Data", First Edition,	O'Reilly Media Publisher, ISBN: 9781491910	399, 2017	
Reference Books:			
Brett Lantz, "Machi	ne Learning with R", Third Edition, ISBN: 9	97817882958	64, 2019,
2 Kaelen Medeiros, " F	R Programming Fundamentals", ISBN: 9781	789612998, 2	018, [Packt]
3 VitorBinanchiLanze	tta, "Hands-On Data Science with R", ISBN:	97817891394	402, 2018,
[Packt]			
4 Omar Trejo Navarro	, "R Programming by Example", ISBN: 9781	1788292542,2	2017, [Packt]

5	Jared P. Lander, "R for Everyone: Advanced Analytics and Graphics Active Advanced Analytics Active Advanced Analytics and Graphics Active Advanced Analytics and Graphics Active Advanced Advanced Advanced Analytics and Graphics Advanced Advance
	Education Publisher, ISBN: 9789386873521, 2018
6	VigneshPrajapati, "Big Data Analytics with R and Hadoop", First Edition, PACKT Publishing
	Limited, ISBN: 9781782163282, 2013
7	Nina Zumel, "Practical Data Science with R", Dreamtech Press Publisher,
	ISBN: 9789351194378, 2014
	Hadley Wickham, "Advanced R", Second Edition, CRC Publisher, ISBN: 978-0815384571,
8	2019

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

S.			
No	Course Title	Duration	Provider -Free
1.	R Programming	4 Weeks	Coursera
2.	Data Analysis with R	8 Weeks	Udacity
3.	Introduction to Data Analytics	9 Weeks	Swayam
4.	Introduction to R Software	9 Weeks	Swayam
5.	Data Science Certification Training – R	14 hours	Simlilearn
	Programming		
Web	Link:		
1.	https://www.datacamp.com/tracks/r-progra	amming	
2.	https://www.tutorialspoint.com/r/index.htm	C.	
3.	https://www.datamentor.io/r-programming/	13 8	
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CO2	S	Μ	М	S	S	S	30 -	-	-	-
CO3	S	S	S	S	М	М	-	L	-	-
CO4	S	S	S	S	S	S	S	S	-	S

Course and a	PRACTICAL IV :	т	т	р	C
Course code	DATA VISUALIZATION LAB	L	I	P	C

Core	/Elective/Supportive	Core	SCAA DATE	2D:518.05.20 2 3
Pr	e-requisite	Basic Programming language	Syllabus Version	2023-2024
Cou	rse Objectives:			
The	main objectives of thi	s course are to:		1.0
	. To understand how	v accurately represent voluminous complex d	ata set in web a	ind from
	To understand the	methodologies used to visualize large data se	•ts	
3	B. To know how to w	ork with visualization tools.		
Fyn	acted Course Outcor	noc•		
	the successful comp	letion of the course student will be able to:		
1	Applying methods for	or visualizing data in D3j, c3j, and Tableau, H	Power BI	K3, k4
2	Apply Visualization	methods for different data domains		K3,K4
3	Design Interactive C	harts based on Data		K2,K3
4	Apply the appropriat and Design an Intera	e data visualization tools for domain specific active data visualization story board for data	applications	K4, K5,K6
K	1 - Remember; K2 - U	Understand; K3 - Apply; K4 - Analyze; K5 -	Evaluate; K6 –	Create
		LIST OF PROGRAMS		75 hours
1.	Visualize prediction	related analysis using visualization tool		
2.	Design a Sales fore	cast analysis dashboard		
3.	Analyze the dataset	of marketing campaigns and visualize the pe	rformance	
4.	Analyze the produc	t related information		
5.	Analyze the dataset	of various crimes		
6.	Demonstrate 3D plo	otting		
7.	Demonstrate scatter	plotting		
8.	Visualize business i	ntelligence		
		Total Le	ecture hours	75 hours
Text	Book(s)			
1	Ben Fry, "Visualizi	ng Data: Exploring and Explaining Data w	vith the Process	sing
	Environment", O'R	eilly, 1 st Edition, 2008.		
2	Scott Murray, "Inter	ractive data visualization for the web: An]	Introduction to) Designing
3	Joshua N. Milligan	2 - Edition, 2017. "Learning Tableau 2010: Tools for Rusing	ss Intelligence	data nron
5	and visual analytic	". Packt Publishing Limited 2019	oo memgenee	aaa prop,
4	Claus O. Wilke. "Fun	damentals of Data Visualization: A Primer on	Making Inform	ative and
	Compelling Figures"	, O.Reilly, 2019.		
Refe	rence Books : EBook	55		
1	Ritchie S. King, "V JavaScrint". Addise	isual Storytelling with D3: An Introducti on-wesley Data and Analytics. 2014.	ion to Data Vi	sualization in
2	Elijah Meeks, "D3 Manning Publication	js in Action: Data visualization with J	avaScript", Se	econd Edition,
3	Lindy Ryan, "Visua	I Data Storytelling with Tableau ", 1st Edit	ion, Pearson, 20)18.
		Course Title	Duration	Provider
1	. Fundamentals o	f Visualization with Tableau	4 Weeks	Coursera
We	b link	Page 31 of 57		

SCAA DATED: 18.05.2023

- 1. https://c3js.org/gettingstarted.html
- 2. <u>https://www.tutorialspoint.com/tableau/index.htm</u>
- 3. <u>https://www.dashingd3js.com/table-of-contents</u>
- 4. https://www.udacity.com-Data Visualization and D3.J

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

Mapp	ing with	Program	mme Ou	tcomes						
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CO3	S	S	S	S	S	М	S	S	-	S
CO4	S	S	М	S	S	М	S	S	-	S



		BIG DATA FRAMEWORKS AND TOOLS	L	Т	Р	С
Core/Elective	/Supportive	Core	4			4
Pre-requisi	te	Basics of Programming	Sylla Versi	bus on	202 202	23- 24
		Page 32 of 57				

M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affiliated Colleges - Annex	ure No.29C
Course Objectives: SCAA DATED:	18.05.2023
 To understand MapReduce programming architecture, processing models. To understand and design MapReduce Programming using PIG and Hive To understand and compare the architectural and processing of MapReduce Program languages Pig, Hive and SPARK 	mming
Expected Course Outcomes:	
1 Understand distributed, MapReduce Processing architectures K2	
2 Configure and setup MapReduce Processing architectures Ecosystem – Hadoop, Spark, Pig and Hive K1, K	2
3 Understand and write MapReduce program using Pig and Hive, SPARK K3	
4 Critically Analyze dataset using Pig , Hive and SPARK and suggest MapReduce Programming models based on domains specific applications K3	
5 Design and setup a Big Data Analytics Ecosystem for specific Business K4, K scenarios.	K5, K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Creat	te
Unit:1 Big Data Framework	12 hours
Introduction to Big Data – Distributed file system –,Hadoop Storage [HDFS], Common	Hadoop Shell
commands - Anatomy of File Write and Read, NameNode, Secondary NameNode, and Da	taNode - Map
Reduce Architecture -Hadoop Configuration: Environment : Steps – Hadoop 1.0 Version	VsHadoop 2.0
YARN – Setting up Hadoop Eco System – Oozie – FLUME- STORM – FLUME - Pig C	onfiguration –
Hive Configuration - SPARK Configuration – Integration – Hadoon with R – Hadoon with	h Python
Unit-2 PIG · ManReduce	12 hours
Pig Introduction: Overview of Pig - Pig Architecture - Pig Execution modes Pig Grunt sh	ell and Shell
commande Big Latin Basis: Data model Data Tunas Operator Big Latin Commande	I and & Stora
Disgnostic Operators Crowning Cogroup Joining Eiltering Serting Splitting Duilt In Fi	Load & Store,
define functions, Dis Execution Modes, Datab Mode, Embedded Mode, Dis Execution i	n Datah Mada
define functions Pig Execution Modes – Batch Mode – Embedded Mode – Pig Execution i	n Batch Mode
- Embedding Pig in Python - Use cases - Map Reduce programs with Pig - Pig Vs SQL	10
Unit:3 Hive: Map Reduce - CURD	10 hours
Introduction of Hive - Hive Features - Hive architecture -Hive Meta store - Hive data types	s – Hive
Tables - Table types - Creating database, Altering database, Create table, alter table, Drop	table, - Built-
In Functions - Built-In Operators, User defined functions –	
Unit:4 Hive: Aggregation and Indexing	12 hours
HiveQL–Introduction to HiveQL, HiveQL Select, HiveQL – MapReduce using HiveQLO	rderBy,Group
By Joins, LIMIT, Distribute By, Cluster By - Sorting And Aggregation – Partitioning – Sta	atic –Dynamic
– Index Creation - Bucketing – Analysis of MapReduce execution – Hive Optimization – S	Setting Hiving
Parameters. – Usecase :MapReduce using Hive QL – HiveQLVs SQL	
Unit:5 SPARK Query	12 hours
SPARK – MapReduce - RDD Transformations – SPARK Operations – Usecase with SPAR	RK and
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3	Ton	n White	e, " Had o	op: The	Definit	ive Guid	le ", O'Re	eilly Med	lia 3rd 🛛	diti on M	ATTED 208205.2023
4	Dor	nald Mi	ner, Ada	m Shool	к, "Мар]	Reduce	Design I	Patterns	", O'Rei	lly Media	a November 22,
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5	Edv	ward Ca	priolo,D	eanWan	npler,Jas	on Ruthe	erglen, "I	Program	nming H	live ", O'l	Reilly Media; 1
	edit	tion, O	ctober, 2	012							
6	Dee	epak Vo	ohra, "Pr	actical H	ladoop E	cosyster	n: A Def	initive G	uide to	Hadoop-	Related Frameworks
	and	Tools"	First Ed	lition, Ap	press Pul	olisher, I	SBN: 97	8148422	21983, 2	016	
7	Ala	n Gates	, "Progi	ramming	g Pig ", C	D'Reilly I	Media; 1	st Editio	n,Octob	er, 2011	
Refe	renc	e Book	s:								
1	Srid	lhar All	a, "Big	Data An	alytics v	vith Hac	loop 3",	First Ed	ition, IS	BN: 978	-1-78862-884-6,
	201	8, [Pacl	ct]								
2	Nar	esh Ku	mar, "N	lodern	Big Dat	a Proce	ssing wi	th Had	oop", IS	SBN: 978	81787122765, 2018,
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3	Nee	erajMall	notra, " E	Data Eng	gineering	g Skills -	Hadooj	Shell:	A Comp	orehensiv	ve Guide to Hadoop
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		MACHINE LEARNING	L	Т	Р	С
Core/Elective/Supportive		Core	4			4

		SCH	A DA LED: 18.05 Syllahus	24,0220
Pre-requis	ite	Basics on Statistics and Linear Algebra	Version	- 2024
Course Obj	ectives:			
1 Tou	nderstand the Co	acents of Machine learning algorithms		
2. To a	pply the machine	learning algorithms for various applications.		
Expected C	ourse Outcomes	•		
CO1 Und	derstand the conce	epts of machine learning.	K1	
CO2 Und	lerstand the vario	us supervised learning techniques	K2	
CO3 Und	K2			
CO4 App	oly Supervised, U	nsupervised and Semi Supervised learning algorith	m K4	
CO5 Und	lerstand and appl	y the concept of Deep Learning	K5, K6	
KI - Reme	mber; K2 - Unde	rstand; K3 - Apply; K4 - Analyze; K5 - Evaluate; J	K6– Create	
				
Unit:1	Machine Lear	ning	12	hours
learning - Ir Evaluating V Other Estim	ates - Counting th	nstances, and Attributes - Output: Knowledge Rep rned: Training and Testing - Predicting Performan ne cost.	presentation-Crec ace - Cross Valid	libility: lation -
TL :4 O			10	L
	Decision Tree			nours
in decision Introduction	tree learning. Dec k = 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1	Bayesian Learning: Naïve Bayes classifier - Ins hbor Learning - Radial Basis Function, Case based	tance Based Le reasoning.	arning:
TL 4.2			10	
		al Networks	12	nours
Artificial Ne	eural Network - I	htroduction – Neural Network Representation - Po	erceptrons – Mu	Itilayer
Analysis - P	CA – Kernel PCA	A A A A A A A A A A A A A A A A A A A	- Linear Discri	
Unit•4	SVM	Statument S- unit	12	hours
SVM · Intro	duction Karne	methods formulation and computation SVM I	ineer classifier	SVM
with two yer	riables non-linea	r classifier Polynomial kernels - Radial Basis Funct	ion Kernels - Clu	stering
with two var	lables – libli-lillea	i classifici-i ofytiolitiai kettiels- Raulai Dasis i uliet.	ion Remeis - Ciu	
Methods - I	ntroduction K-	Means- Expectation-Maximization Algorithm, H	ierarchical Clust	ering _
Methods In Choosing th	ntroduction – K- e Number of Clus	Means- Expectation-Maximization Algorithm- H	ierarchical Clust	ering -
Methods In Choosing th	ntroduction – K- e Number of Clus	Means- Expectation-Maximization Algorithm- H sters.	ierarchical Clust	ering -
Methods In Choosing th	ntroduction – K- e Number of Clus	Means- Expectation-Maximization Algorithm- H sters.	ierarchical Clust	ering -
Methods In Choosing th Unit:5	ntroduction – K- e Number of Clus Deep Learning	Means- Expectation-Maximization Algorithm- H sters.	ierarchical Clust	hours
Methods In Choosing th Unit:5 Deep Learn Belief Netw Email marke	ntroduction – K- e Number of Clus Deep Learning ing – Deep feed orks -Recurrent 2 eting system (Mal	Means- Expectation-Maximization Algorithm- H sters. g forward network – Convolutional neural network Neural Network - Use Cases: Finding similar user nout).	ierarchical Clust 10 – Autoencoders rs in Twitter (M	hours -Deep ahout),
Methods In Choosing th Unit:5 Deep Learn Belief Netw Email marke	ntroduction – K- e Number of Clus Deep Learning ing – Deep feed orks -Recurrent D eting system (Mal	Means- Expectation-Maximization Algorithm- H sters. g forward network – Convolutional neural network Neural Network - Use Cases: Finding similar user nout).	ierarchical Clust 10 Autoencoders rs in Twitter (M	hours -Deep ahout),
Methods In Choosing th Unit:5 Deep Learn Belief Netw Email marke	ntroduction – K- e Number of Clus Deep Learning ing – Deep feed orks -Recurrent eting system (Mal Contemporary	Means- Expectation-Maximization Algorithm- H sters. g forward network – Convolutional neural network Neural Network - Use Cases: Finding similar user nout). 7 Issues	ierarchical Clust 10 1 - Autoencoders rs in Twitter (M 2	hours -Deep ahout), hours
Methods In Choosing th Unit:5 Deep Learn Belief Netw Email marke Unit:6 Expert lectu	ntroduction – K- e Number of Clus Deep Learning ing – Deep feed orks -Recurrent D eting system (Mal Contemporary res, online semina	Means- Expectation-Maximization Algorithm- H sters. g forward network – Convolutional neural network Neural Network - Use Cases: Finding similar user nout). v Issues ars – webinars	ierarchical Clust 10 1 - Autoencoders rs in Twitter (M 2	hours -Deep ahout), hours
Methods In Choosing th Unit:5 Deep Learn Belief Netw Email marke Unit:6 Expert lectu	ntroduction – K- e Number of Clus Deep Learning ing – Deep feed orks -Recurrent Deting system (Mal Contemporary res, online semina	Means- Expectation-Maximization Algorithm- H sters. g forward network – Convolutional neural network Neural Network - Use Cases: Finding similar user nout). 7 Issues ars – webinars Total Lecture hours	ierarchical Clust 10 1 - Autoencoders rs in Twitter (M 2 60 1	hours hours -Deep ahout), hours hours
Methods In Choosing th Unit:5 Deep Learn Belief Netw Email marke Unit:6 Expert lectu Text Book	ntroduction – K- e Number of Clus Deep Learning ing – Deep feed orks -Recurrent Deting system (Mal Contemporary res, online semina	Means- Expectation-Maximization Algorithm- H sters. g forward network – Convolutional neural network Neural Network - Use Cases: Finding similar user nout). 7 Issues ars – webinars Total Lecture hours	ierarchical Clust 10 Autoencoders rs in Twitter (M 2) 60 1	hours hours hours hours hours
Methods In Choosing th Unit:5 Deep Learn Belief Netw Email marke Unit:6 Expert lectu Text Book	ntroduction – K- e Number of Clus Deep Learning ing – Deep feed orks -Recurrent Deting system (Mal Contemporary res, online semina s:	Means- Expectation-Maximization Algorithm- H sters. g forward network – Convolutional neural network Neural Network - Use Cases: Finding similar user nout). 7 Issues ars – webinars Total Lecture hours ng: Practical Machine Learning Tools and Techniou	ierarchical Clust 10 1 - Autoencoders rs in Twitter (M 21 60 1 nes, Fourth editic	hours -Deep ahout), hours hours on,
Methods In Choosing th Unit:5 Deep Learn: Belief Netw Email marke Unit:6 Expert lectur Text Book 1 Ian V More	ntroduction – K- e Number of Clus Deep Learning ing – Deep feed orks -Recurrent Deting system (Mal Contemporary res, online semina s: Vitten, Data minin gan Kaufmann Pu	Means- Expectation-Maximization Algorithm- H sters. g forward network – Convolutional neural network Neural Network - Use Cases: Finding similar user nout). 7 Issues ars – webinars Total Lecture hours ng: Practical Machine Learning Tools and Techniqu blishers.	ierarchical Clust 10 - Autoencoders rs in Twitter (M 2 60 ues, Fourth edition	hours hours hours hours hours hours

	3	K.P. Soman, Machine Learning with SVM and Other Kernel Methods A20 DAPHED Public bing 23										
	Refer	Reference Books										
	1	JannesKlaas, "Machine Learning for Finance", ISBN: 978178936364, 2019 [Packt]										
		Giuseppe Bonaccorso, "Machine Learning Algorithm	ns", Second Edition	n, ISBN:								
4	2	9781789347999, 2018 [Packt]										
~ •	3	Stephen Marsland, "Machine Learning – An Algorithmic Perspective", CRC Press, 2009										
4	4	Hastie, Tibshirani, Friedman, "The Elements of Stati	stical Learning", S	econd Edition, Springer,								
		2008										
	5	Yuxi Liu, "Python Machine Learning By Example",	2017 [Packt]									
(6	John Paul Mueller, Luca Massaron, "Machine Lea	rning (in Python	and R) For Dummies",								
		First Edition, Wiley Publisher, ISBN: 97881265630)50, 2016									
ŕ	7	U Dinesh Kumar Manaranjan Pradhan,,"Machine L	earning using Pytl	non".) Publisher: Wiley,								
L		ISBN: 9788126579907, 2019		T								
	Onli	ine Course:										
	S. No	o Course Title	Duration	Provider -Free								
	1.	Machine Learning	12 hours	Simplilearn								
	2.	Machine Learning for Data Analysis	4 Weeks	Coursera								
3. Machine Learning Foundations: A Case Study 6 Weeks Coursera												
		Ammongh										

	Approach		
4.	Machine Learning : Regression	6 Weeks	Coursera
5.	Introduction to Machine Learning	12 Weeks	Swayam - NPTEL
6	Deep Learning Specialization	4 Courses	Coursera
		5 A A	•

Web Link - Video:

1. https://www.packtpub.com/data/hands-on-machine-learning-with-scikit-learn-and-tensorflow-2-0-video

2. https://www.packtpub.com/data/machine-learning-projects-with-tensorflow-2-0-video

ь

3.https://www.packtpub.com/application-development/complete-machine-learning-course-python-video

Mapping with Programme Outcomes												
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	S	S	S	L	L	Μ	Μ	М	L		
CO2	S	S	S	-	-	-	-	-	-	L		
CO3	S	S	-	-	-	-	L	L	L	L		
CO4	S	S	S	S	L	Μ	Μ	Μ	М	М		
CO5	S	S	S	S	S	S	S	S	S	S		

	BUSINESS ANALYTICS	L	Т	Р	С
Core/Elective/Supportive	Core	4			4
Pre-requisite	Foundations of Data Science	Sylla Vers	bus sion	202 202	3- 4

M.Sc. Data Analytics w.e.i. 2023-24 onwards - Affiliated Colleges	- Annexure No.29C							
The main objectives of this course are to:	JATED: 18.05.2025							
1. To understand the Probability Theory								
2. To understand theoretical distributions and automata theory								
Expected Course Outcomes:								
On the successful completion of the course, student will be able to:								
1 Compare various domain areas and their challenges	K2							
2 Apply the concepts of analytics to make better decisions	К3							
3 Examine use cases for different domains.								
4 Evaluate the challenges faced in various domains and choose appropriate	K5							
analytics solutions in all domains								
5 Propose suitable analytics solutions as required by the use cases.	K5, K6							
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K	Contraction Create							
Unit:1	12 hours							
Healthcare analytics – Introduction - Potential contributions - Challenges of health	hcare industry -							
current and ruture state of nealthcare analytics – top nealthcare analytics adaptation	ons							
Unit-2	12- hours							
Banking and Finance: Systems of Banking – Commercial Banking – New Finance	ial							
Services: Overview of Analytics in Insurance: Key Insurance Analytics – Challen	ges – Health							
Insurance Analytics, Life Insurance Analytics- Types of Insurance – Housing Fin	ance.							
11-:4-2	10 hours							
Unit:5	iness							
Telecommunication: Introduction - End-Oser Needs and Demands- Telecom Bus								
Unit:4	12 hours							
Retail analytics – Understanding the new consumer – Marketing in a consumer-	lriven era -Managing							
the brand to drive loyalty								
Unit:5	12 hours							
Case studies: Walmart, Netflix, Facebook, Uber, Amazon, Kaggle								
Unit:6 Contemporary Issues	2 hours							
Expert lectures, online seminars – webinars	2 11001 5							
Total Lecture hours	60 hours							
Reference Books								
1 Dwight McNeill(2013). A Framework for Applying Analytics in Healthcare: What	Can Be							
Learned from Best Practices in Banking, Retail, Politics and Sports, Pearson Educa	ution							
2 Gomez Chitord(2011). Banking and Finance Theory Law and practice, PHI Learning	ng							
3 Patricia L.Saporito(2014). Applied Insurance Analytics: A Framework for Driving	More Value							
from Data Assets, Technologies and Tools, Pearson Education LTD								
from Data Assets, Technologies and Tools, Pearson Education LTD 4 Anders Olsson(2005). Understanding Changing Telecommunications, Wiley Public	ations							
 from Data Assets, Technologies and Tools, Pearson Education LTD 4 Anders Olsson(2005). Understanding Changing Telecommunications, Wiley Public 5 Jennifer LeClaire, Danielle Dahlstrom, Vivian Braun. Business analytics in Redummies, 2nd IBM Limited edition. 	ations etail for							

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

Mappi	Mapping with Programme Outcomes													
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10				
CO1	S	М	М	L	-	-	-	-	-	М				
CO2	S	М	S	S	М	-	S	L	-	М				
CO3	S	S	S	L	-	L	М	L	-	L				
CO4	М	М	S	S	-	-	S	-	-	L				
CO5	S	S	S	М	-	L	М	L	-	L				



Course code		PRACTICAL V : BIG DATA ANALYTICS LAB	L	Т	Р	С
Core/Elective/Supportive		Core			5	4
Pre-requisite		Basics of Programming	Syl Ve	labus rsion	2023-	2024

M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affiliated College	s - Annexure No.29C
Course Objectives: SCAA	DATED: 18.05.2023
 To understand MapReduce programming architecture, processing models To understand and design MapReduce Programming using PIG and Hive To understand and compare the architectural and processing of MapReduc languages Pig, Hive and SPARK 	ce Programming
Expected Course Outcomes:	
On the successful completion of the course, student will be able to:	
1Configure and setup MapReduce Processing architectures Ecosystem –1Hadoop, Spark, Pig and Hive	K1, K2
2 Create a MapReduce program using Pig and analyse dataset using Pig Latir Scripts	¹ K3,K4,K5,K6
3 Apply Hive commands on a dataset	К3
4 Develop a MapReduce program using SPARK	K3,K4 , K5, K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;	K6 – Create
LIST OF PROGRAMS	75 hours
1. Installation of Hadoop, Spark, Pig and Hive	
2. File Management tasks in Hadoop	
3. Word Count Map Reduce program to understand Map Reduce Paradi	gm
4. Pig Latin scripts to sort, group, join, project, and filter your data.	
5. Hive Databases, Tables and Views	
6. Hive Functions and Indexes	
7. Hive UDFs (User Defined Functions)	
8. Exercises on SPARK MapReduce	
Expert lectures, online seminars – webinars	

Text Book(s):

	Boris Lublinsky Kevin T. Smith Alexey Yakubovich, Professional Hadoop® Solutions, Wiley,
1	ISBN: 9788126551071,2015.
2	Chris Eaton, Dirk deroos et al., "Understanding Big data", McGraw Hill, 2012.
3	Tom White, "Hadoop: The Definitive Guide", O'Reilly Media 3rd Edition, May 6, 2012
4	Donald Miner, Adam Shook, "MapReduce Design Patterns", O'Reilly Media November 22,
	2012
5	Edward Capriolo, Dean Wampler, Jason Rutherglen, "Programming Hive", O'Reilly Media; 1
	edition, October, 2012
6	Deepak Vohra, "Practical Hadoop Ecosystem: A Definitive Guide to Hadoop-Related
	Frameworks and Tools" First Edition, Apress Publisher, ISBN: 9781484221983, 2016
7	Alan Gates, "Programming Pig", O'Reilly Media; 1st Edition, October, 2011
Refe	rence Books:
1	Sridhar Alla, "Big Data Analytics with Hadoop 3", First Edition, ISBN: 978-1-78862-884-6,
	2018, [Packt]

2	Naresh Kumar "Modern Big Data Processing with Hadoon" ISBNA 07814781702056520133													
2	[Dool:t]	umar, r	viouern	Dig Dat	a Froces	ssing	witi	Пацо	op , 15a		4 0121221/019,2201203			
2		11	«D-4- E	·	Cl-1	. 1	T. J		-11. A 4	<u></u>	handers Carils 4.			
3	Hadoon FS Commands" First Edition CreateSpace Independent Publishing													
	Hadoop	Ison or 1717577511 2018												
	ISBN: 9/81/1/5//511, 2018													
4	VigneshPrajapati, "Big Data Analytics with R and Hadoop", First Edition, ISBN: 978-1-													
•	78216-328-2, 2013, [Packt]													
5	Edward Capriolo, "Programming Hive: Data Warehouse and Ouerv Language for													
5	Education Characterister Service Serv													
	Hadoop", First Edition, O'Reilly MediaPublisher, ISBN: 9781449319335, 2012													
Relate	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]													
S. No	No Course Title Duration Provider - Free													
1.	Big Dat	ta Hadoc	op and Sp	park Dev	veloper –	R	26	hours		Simplil	earn			
	Programming													
2.	2. Intro to Hadoop and MapReduce 4 Weeks Udacity													
3.	Hadoor	Platfor	m and A	pplicatio	n		5 V	Veeks		Course	ra			
	Framew	vork	_											
4.	Big Dat	ta Essent	tials: HD	FS, Map	Reduce	and	6 V	Veeks		Course	ra			
	Spark F	RDD												
5.	Mining	Massive	e Dataset	ts			7 V	Veeks		edX				
Web	Link – V	ideo				auguar)								
1.	http://hac	looptuto	rial.info/	mapredu	ice-prog	ramm	ing-	model/						
2	https://ł	nadoop.a	pache.or	g/docs/r	1.2.1/ma	pred_	tuto	orial.htm	nl					
3	https://ł	nadoop.a	pache.or	:g/docs/c	urrent/ha	adoop	o-ma	preduce	e-client/l	nadoop-r	napreduce-client-			
	core/Ma	apReduc	eTutoria	l.html	and the second		27	1	M	-	-			
4	. https://v	www.edu	ureka.co/	′blog/ma	preduce-	tutori	ial/	3 M						
				1 3	CALLINA.	UNIV			,					
						and the	_	30						
Mappi	ing with Pr	rogramm	e Outcor	mes	Stein	nast 🛀	waso				I			
Cos	PO1	PO2	PO3	PO4	PO5	PO	6	PO7	PO8	PO9	PO10			
CO1	S	S	S	S	M	S		-	Μ	-	М			
CO2	М	Μ	M	S	-	-		-	Μ	-	М			
CO3	S	S	S	S	Μ	M	[S	L	-	S			
CO4	S	S	S	S	S	S		S	S	_	S			

		PRACTICAL VI : MACHINE SCAA	DAT	ED:	18.05.2	023
Course	code	LEARNING LAB	L	Т	Р	С
Core/Ele	ective/Supportive	Core			5	4
Pre-requisiteBasics of Machine LearningSyllabus Version						-2024
Course	Objectives:					
The mai 1. Build 2.Build 3. Create 4. Test a	in objectives of th models using cla models using clus e classification an and evaluate the n	is course are to: ssification algorithm for real world problems stering algorithm for real world problems d clustering models nodels				
Expecte	ed Course Outco	mes:				
On th	e successful comp	bletion of the course, student will be able to:				
1 Ur	nderstand the vari	ous supervised learning techniques			K	2
2 Ur	nderstand the theo	oretical concepts of linear methods			K	2
3 A1	pply Supervised,	Unsupervised and Semi Supervised learning algorithm			K	4
4 Uno	derstand and appl	y the concept of Deep Learning			K5, K	5
K1 - I	Remember; K2 -	Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;	K6 -	Creat	te	
				[
Insulana	ant the following	LIST OF PROGRAMS			75 ho	urs
Inpreme	1.Exercise to m 2.Exercises to l 3.Exercise for l 4.Exercise to ex 5.Exercise to in 6.Exercise to in 7.Exercise to in 8.Exercises for	anipulate data using different queries oad dataset into sci-kit learn Building models in sci-kit learn stract features from datasets nplement Regression nplement SVM Classifier nplement K-Means Clustering Deep learning				
	9.Exercises to I	Build a data pipeline				
		Total Lecture ho	ours		75 hou	ırs



	TEXT ANALYTICS	L	Т	Р	С
Core/Elective/Supportive	Elective	4			4

11C-requis	site	S	CSyAlabas H	D: 18.05.202 2023-2024
- Carries Ohi			Version	
Course Obj 1 To u	Jecuves:	t mining and NI P techniques		
2. To u	nderstand and an	plyprobabilistic models clustering and classific	ation for tex	t analytics.
3. To u	nderstand and ap	oly text analytics approaches in different domain	ns.	t unur uss.
4. To u	nderstand represe	ntation and handling of opinions by people in d	lifferent way	'S.
5. To a	nalyse different c	hallenges in sentiment analysis and aspect-orier	nted sentime	nt analysis
class	sification and anal	yse fake opinion detection and intention classif	ication	
Expected C	ourse Outcomes	:		
On the suc	cessful completio	n of the course, student will be able to:		
1 Under	stand the concepts	of text mining and text pre-processing techniques	B	K1, K2
2 Apply	the probabilistic n	nodels, clustering and classification for text analy	vtics	K3
3 Design applica	a text analytic fra	mework to analyze text data for domain specific		K4, K5 K6
4 Introd	uction to sentime	nt analysis and its applications		K1,K2
5 Create	different types of	f opinion summary from the given data sources		K1,K3
6 Identif	fying opinion qua	lity, author intention and fake opinions		K1,K4
K1 - Reme	ember; K2 - Unde	rstand; K3 - Apply; K4 - Analyze; K5 - Evalua	te; K6 – Cre	ate
Unit:1	Text Mining			10 hours
Unit:1 Text Minin	Text Mining g - Definition -	General Architecture – Core Text mining	Operations	10 hours Nature of
Unit:1 Text Minin unstructured	Text Mining g - Definition - l and semi-struct	General Architecture – Core Text mining ured text, collecting documents NLP: Text p	Operations. pre-processir	10 hours Nature of ag-Sentence
Unit:1 Text Minin unstructured Segmentatio	Text Mining g - Definition - l and semi-struct on tokenization - le	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor	Operations. pre-processir rds- POS, Ba	10 hours Nature of ag-Sentence ag of Words
Unit:1 Text Minin unstructured Segmentatic Model, n-g	Text Mining g - Definition - l and semi-struct on tokenization - le rams, chunking a	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu	Operations. ore-processir rds- POS, Ba s - sentenc	10 hours Nature of ag-Sentence ag of Words e boundary
Unit:1 Text Minin unstructured Segmentatio Model, n-gr determinatio	Text Mining g - Definition - l and semi-struct on tokenization - le rams, chunking a on - Textual inform	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu nation to numerical vectors -vector generation for	Operations. ore-processir rds- POS, Ba s - sentenc or prediction	10 hours Nature of ag-Sentence ag of Words boundary - document
Unit:1 Text Minin unstructured Segmentatio Model, n-gr determinatio standardizat	Text Mining g - Definition - l and semi-struct on tokenization - le rams, chunking a on - Textual inform ion and Represen	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (Operations. ore-processir rds- POS, Ba s - sentenc or predictior TDM)-TDM	10 hours Nature of ag-Sentence ag of Words e boundary - document [Frequency
Unit:1 Text Minin unstructured Segmentation Model, n-gr determination standardizat	Text Mining g - Definition - l and semi-struct on tokenization - le rams, chunking a on - Textual inform ion and Represen Information res	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (" trieval and Extraction	Operations. ore-processir rds- POS, Ba s - sentenc or predictior TDM)-TDM	10 hours Nature of ag-Sentence ag of Words e boundary - document [Frequency 12 hours
Unit:1 Text Minin unstructured Segmentatio Model, n-gr determinatio standardizat Unit:2 Information	Text Miningg - Definition -l and semi-structon tokenization - larams, chunking aon - Textual informion and RepresenInformation refretrieval- keyword	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu- nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (' trieval and Extraction rd search - Vector space scoring, Models - web	Operations. ore-processir rds- POS, Ba s - sentenc or prediction TDM)-TDM	 10 hours Nature of ng-Sentence ng of Words e boundary n- document I Frequency 12 hours ument search
Unit:1 Text Minin unstructured Segmentatio Model, n-gi determinatio standardizat Unit:2 Information matching-in	Text Miningg - Definition -l and semi-structon tokenization - lerams, chunking aon - Textual informion and RepresenInformation reeretrieval- keywordverted lists. Info	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu- nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (' trieval and Extraction rd search - Vector space scoring, Models - web prmation extraction-Architecture - Co-referen	Operations. ore-processir rds- POS, Ba s - sentenc or predictior TDM)-TDM - based doct ce - Name	10 hours Nature of ag-Sentence ag of Words boundary - document Frequency 12 hours ument search d Entity and
Unit:1 Text Minin unstructured Segmentatio Model, n-gi determinatio standardizat Unit:2 Information matching-in Relation Ext	Text Miningg - Definition -l and semi-structon tokenization - lerams, chunking aon - Textual informion and RepresenInformation refretrieval- keywordverted lists. Infotraction-Template	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu- nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (* trieval and Extraction rd search - Vector space scoring, Models - web ormation extraction-Architecture - Co-referen filling and database construction –Applications	Operations. ore-processir rds- POS, Ba s - sentenc or prediction <u>TDM)-TDM</u> - based docu ce - Name . Inductive -	 10 hours Nature of ng-Sentence ag of Words e boundary n- document 1 Frequency 12 hours ument search d Entity and Unsupervised
Unit:1 Text Minin unstructured Segmentatio Model, n-gr determinatio standardizat Unit:2 Information matching-in Relation Ext Algorithms	Text Mining g - Definition - l and semi-struct on tokenization - le rams, chunking a on - Textual inforr ion and Represen Information ref retrieval- keywor verted lists. Info traction-Template for Information E	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu- nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (* trieval and Extraction rd search - Vector space scoring, Models - web ormation extraction-Architecture - Co-referen filling and database construction – Applications xtraction.	Operations. ore-processir rds- POS, Ba s - sentenc or prediction TDM)-TDM - based doct ce - Name . Inductive -	 10 hours Nature of ag-Sentence ag of Words boundary document Frequency 12 hours ument search d Entity and Unsupervised
Unit:1 Text Minin unstructured Segmentatio Model, n-gr determinatio standardizat Unit:2 Information matching-in Relation Ext Algorithms Text Catego	Text Mining g - Definition - and semi-struct on tokenization - le rams, chunking a on - Textual information reference Information reference retrieval- keyword verted lists. Information E for Information E prization – Defini iccation – Gini Indefinition	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu- nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (* trieval and Extraction rd search - Vector space scoring, Models - web ormation extraction-Architecture - Co-referen filling and database construction –Applications extraction. tion – knowledge engineering,Text Classification extinction Gain Evaluating model: confus	Operations. ore-processir rds- POS, Ba s - sentenc or prediction TDM)-TDM - based docu ce - Name . Inductive - ion, Feature	 10 hours Nature of ag-Sentence ag of Words e boundary - document I Frequency 12 hours ument search d Entity and Unsupervised Selection fo class specific
Unit:1 Text Minin unstructured Segmentation Model, n-gr determination standardizat Unit:2 Information matching-in Relation Ext Algorithms Text Catego Text Classif measure Cl	Text Miningg - Definition -l and semi-structon tokenization - larams, chunking aon - Textual informion and RepresenInformation representInformation representretrieval- keywordverted lists. Infotraction-Templatefor Information Eprization – Definitfication, Gini Indeassification mode	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu- nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (* trieval and Extraction rd search - Vector space scoring, Models - web ormation extraction-Architecture - Co-referen filling and database construction – Applications extraction. tion – knowledge engineering, Text Classification ext, Information Gain. Evaluating model: confuse els: Decision Tree Classifiers -Rule- based Con-	Operations. ore-processir rds- POS, Ba s - sentenc or prediction TDM)-TDM - based docu ce - Name . Inductive - ion, Feature sion matrix, Classifiers -	 10 hours Nature of ag-Sentence ag of Words boundary document Frequency 12 hours ument search d Entity and Unsupervised Selection for class specific Naive Baves
Unit:1 Text Minin unstructured Segmentation Model, n-gr determination standardizat Unit:2 Information matching-in Relation Ext Algorithms Text Catego Text Classifi measure Cl Classifiers -	Text Mining g - Definition - l and semi-struct on tokenization - le rams, chunking a on - Textual inforr ion and Represen Information ref retrieval- keywor verted lists. Info traction-Template for Information E orization – Defini fication, Gini Inde assification mode Methods for Tex	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu- nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (* trieval and Extraction rd search - Vector space scoring, Models - web ormation extraction-Architecture - Co-referen filling and database construction – Applications extraction. tion – knowledge engineering,Text Classification extraction. tion – knowledge engineering,Text Classification extraction. tion – knowledge engineering model: confuse els: Decision Tree Classifiers -Rule- based Co t Clustering –Distance and similarities	Operations. ore-processir rds- POS, Ba s - sentenc or prediction TDM)-TDM - based doct ce - Name . Inductive - ion, Feature sion matrix, lassifiers -	 10 hours Nature of ag-Sentence ag of Words boundary document Frequency 12 hours ument searched Entity and Unsupervised Selection for class specific Naive Bayes
Unit:1 Text Minin unstructured Segmentation Model, n-gr determination standardizat Unit:2 Information matching-in Relation Ext Algorithms Text Catego Text Classifi measure Cl Classifiers -	Text Mining g - Definition - l and semi-struct on tokenization - le rams, chunking a on - Textual inforr ion and Represen Information ref retrieval- keywor verted lists. Info traction-Template for Information E prization – Defini ication, Gini Inde assification mode Methods for Tex	General Architecture – Core Text mining ured text, collecting documents NLP: Text p emmatization - stemming - Parsing text - keywor and Named Entity Recognition (NER) Corpu- nation to numerical vectors -vector generation for tation – Inverted Index-term document matrix (* trieval and Extraction rd search - Vector space scoring, Models - web ormation extraction-Architecture - Co-reference filling and database construction – Applications extraction. tion – knowledge engineering, Text Classification ext, Information Gain. Evaluating model: confuse els: Decision Tree Classifiers -Rule- based Co t Clustering –Distance and similarities	Operations. ore-processir rds- POS, Ba s - sentenc or prediction TDM)-TDM - based docu ce - Name . Inductive - ion, Feature sion matrix, lassifiers -	10 hours Nature of ag-Sentence ag of Words boundary document Frequency 12 hours ument searched Entity and Unsupervised Selection for class specific Naive Bayes

Probabilistic Models: Introduction, Mixture Models, Stochastic Processes in Bayesian Nonparametric Models, Graphical Models, Probabilistic Models with Constraints, Parallel Learning Algorithms. Probabilistic Models for Information Extraction -Hidden Markov Models -Stochastic Context-Free Grammars - Maximal Entropy Modeling -Maximal Entropy Markov Models - Conditional Random Fields

M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affiliated Colleges - Annexure No.29C Unit:4 **Sentiment Analysis** SCAA DATED2-18 Noti202 Introduction: Sentiment Analysis Applications - Sentiment Analysis Research - Sentiment Analysis as Mini NLP. The Problem of Sentiment Analysis: Definition of Opinion - Definition of Opinion Summary - Affect, Emotion, and Mood - Different Types of Opinions - Author and Reader Standpoint. Document Sentiment Classification: Supervised Sentiment Classification - Unsupervised Sentiment Classification - Sentiment Rating Prediction - Cross-Domain Sentiment Classification - Cross-Language Sentiment Classification - Emotion Classification of Documents. **12--** hours Unit:5 **Subjectivity Classification and Challenges** Subjectivity - Sentence Subjectivity Classification - Sentence Sentiment Classification - Dealing with Conditional Sentences - Dealing with Sarcastic Sentences - Cross-Language Subjectivity and Sentiment Classification - Using Discourse Information for Sentiment Classification - Emotion Classification of Sentences. Subjectivity classification and Aspect Based sentiment classification. Sentiment Lexicon Generation: Dictionary-Based Approach - Corpus-Based Approach - Desirable and Undesirable Facts. Use Cases: Detecting Fake or Deceptive Opinions: Different Types of Spam - Supervised Fake Review Detection - Supervised Yelp Data Experiment - Automated Discovery of Abnormal Patterns - Model-Based Behavioral Analysis - Group Spam Detection - Identifying Reviewers with Multiple User ids - Exploiting Business in Reviews - Some Future Research Directions. Unit:6 **Contemporary Issues** 2-- hours Challenges of text analytics approaches for regional specific languages **Total Lecture hours** 60-- hours **Text Book(s)** Murugan Anandarajan "Practical Text Analytics: Maximizing the Value of Text Data", Springer; 2018 1 2 Charu C. Aggarwal Machine Learning for Text 2018 Steven Bird, Ewan Klein and Edward Loper" Natural Language Processing with Python" 3 Bing Liu "Sentiment Analysis: Mining Opinions, Sentiments and Emotions, Cambridge University 4 Press, 2015. **Reference Books** 1 Markus Hofmann, Andrew Chisholm "Text Mining and Visualization: Case Studies Using Open-Source Tools,", CRC press, Taylor & Francis, 2016 Charu C. Aggarwal , Cheng Xiang Zhai, Mining Text Data, Springer; 2012 2 3 Dipanjan Sarkar Text Analytics with Python, 2016 4 Bing Liu "Sentiment Analysis and Opinion Mining, Morgan & Claypool Publishers, 2012. Erik Cambria, Dipankar Das "A Practical Guide to Sentiment Analysis" Springer, 2017. 5 Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] 1 Business Analytics & Text Mining Modelling Using Python, IIT Roorkeehttps://swayam.gov.in/ 2 Natural Language Processing, IIT Kharagpurhttps://swayam.gov.in/ 3 Text Mining and Natural Language Processing in Rhttps://www.udemy.com/ Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	Μ	Μ	Μ	-	-	-	S	S	S	S
CO2	Μ	М	Μ	S	-	-	S	S	S	S
CO3	S	S	S	S	S	Μ	S	S	S	S
CO4	S	S	S	S	S	-	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S



		HEALTH CARE DATA ANALVTICS	T	Т	р	С
		HEALTH CARE DATA ANALT HOS		1	1	C
Core/E	lective/Supportive	Elective	4			4
Due w	anicita	Deging on Statistics and Lincon Algebra	Sylla	abus	202	23-
Pre-re	equisite	Basics on Staustics and Linear Algebra	Version		2024	
Course	Objectives:					
1. 2. 3. 4.	To understand the Pro Understand Data stand Design Integrated Hea Understand and Reme	cess ,Concepts and Procedures in Health Care Data lards used in Health Care Domain alth Care Data Models for Data Analytics ember the Ethics of Managing and Analyzing Healt	L Digit	al Sys e Data	stem	IS
Expect	ed Course Outcomes	:				
CO1	Understand the Proc	ess and Data Functionalities of Health Care Data	K	1, K2	2	
CO2 Understand the various Data Sources, diagnostic standards and Components of Data Analytics K2, K1						
CO3	Understand and desi	gn Integrated Data Model for analytics	K	2, K5		

	M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affiliated Coll	leges - Annexure No.29C
CO4	Apply ETL for data analysis and create dashboards SC.	CAA D K3;HO 4 18.05.2023
COS	Create and evaluate prediction models in healthcare applications for	K6
05	preventive care and personalized medicines	KO
K1 - F	Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;	e; K6 – Create
Unit:1	Health Care Systems	12 hours
Introdu	ction :Health Care Entities - Electronic Health Care Records - Clinical	l Data - Health Care Big
Data Sc	ources-Patient Data - Administrative Data - Genomics Data - Imaging	g Data- Insurance Data –
Diagno	stic Data – Clinical Data— Social Media – Survey Data – Family Data	a – Data Quality – Data
Ethics -	- Data Integration Challenges	
Unit:2	2. Data Models and Data Standards	12 hours
Data M	odels : Relational Models – Hierarchical Models – Data warehousing I	Models – Star Schema –
Normal	ized Data and Deformalized – Health Care Knowledge Representation	Ontologies – Diagnosis
Standar	ds - ICD 9/10 - DSMI - DSM II -Drug Standards SNOWMED	-LOINC - Laboratory
Standar	ds – Data Challenges in Data Mapping -Data Standards as Linked Data	a
Unit:3	Big Data and Data Analytics	10 hours
Data A	nalytics: Data Cleaning and Pre-Processing – Data Processing and Mod	deling - Classification –
Cluster	ing – Dimensionality Reduction - Prediction Machine Learning – Micro	osoft Azure Cloud -Data
Visuali	zing – Histogram – Boxplot- Scatter Plot – Bar – Pie – Mosaic Plot – Tre	rends Lines – Heat Maps
– Densi	ty Plots - Dashboard – Creation - Presentation	
Unit:4	Advanced Health Care Analytics	12 hours
Genom	ics Data Analysis – Microarray Data – Sequence Data – Research S	Survey Analysis – Text
Mining	 Tele Health – Virtual Health Care Assistance 	
Unit:5	Health Care Usecase	12 hours
Predicti	on of Risk of Co morbidity Individuals – Outbreak – Epidemics - Perso	onalized Medical Care –
Pharma	ceuticals and Patient Data Integration – Clinical Data	
Unit:6	6 Contemporary Issues	2 hours
Expert	lectures, online seminars – webinars	
	Total Lecture hours	rs 60 hours
	Sale Selection of Sales	

Text	Books:								
1	Christopher Bishop, "Pattern Recognition and Machine Learning" Springer, 2006								
2	Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012								
3	Ethem Alpaydin, "Introduction to Machine Learning 3(Adapti	ve Computation	on and Machine						
	Learning Series)", Third Edition, MIT Press, 2014								
4	Tom M Mitchell, "Machine Learning", First Edition, McGraw	Hill Education	on, 2013.						
Refer	ence Books								
1	Jannes Klaas, "Machine Learning for Finance", ISBN: 978178	936364, 2019	[Packt]						
2	Giuseppe Bonaccorso, "Machine Learning Algorithms", Secon	nd Edition, IS	BN: 2018 [Packt]						
3	Stephen Marsland, "Machine Learning - An Algorithmic Persp	ective", CRC	Press, 2009						
4	Hastie, Tibshirani, Friedman, "The Elements of Statistical Lea	rning", Secon	d Edition,						
	Springer, 2008								
5	Yuxi Liu, "Python Machine Learning By Example", 2017 [Pad	ckt]							
6	John Paul Mueller, Luca Massaron, "Machine Learning (in Py Edition Wiley Publisher ISBN: 9788126563050, 2016	thon and R) F	or Dummies", First						
7	U Dinesh Kumar ManaranianPradhan. "Machine Learning us	ing Python"	Publisher: Wiley						
,	ISBN: 9788126579907, 2019	ing i juion ()	, i densheri (filey,						
Onlin	e Course:								
S. No	Course Title	Duration	Provider -Free						
1.	Machine Learning	12 hours	Simplilearn						
2.	Machine Learning for Data Analysis	4 Weeks	Coursera						
3.	Machine Learning Foundations: A Case Study Approach	6 Weeks	Coursera						
4.	Machine Learning : Regre <mark>ssion</mark>	6 Weeks	Coursera						
5.	Introduction to Machine Learning	12 Weeks	Swayam -NPTEL						
6	Deep Learning Specialization	4 Courses	Coursera						
XX7-1-1	terle X7: Jacob								

Web Link - Video:

1. https://www.packtpub.com/data/hands-on-machine-learning-with-scikit-learn-and-tensorflow-2-0-video

2. https://www.packtpub.com/data/machine-learning-projects-with-tensorflow-2-0-video

3.https://www.packtpub.com/application-development/complete-machine-learning-course-python-video

Mapping with Programme Outcomes

	0	0								
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	М	М	М	-	-	-	S	S	S	S
CO2	М	М	М	S	-	-	S	S	S	S
CO3	S	S	S	S	S	М	S	S	S	S
CO4	S	S	S	S	S	-	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

	BEHAVIOURAL DATA ANALYTICS	L	Т	Р	С
Core/Elective/Supportive	Elective Page 47 of 57	4			4

Pre-ree	Syllabus:	20.23- 2023				
	quisite	Dusies on Statistics and Enfeat Algeora		Version	2024	
Course	Objectives:					
1) To fa Educati 2) Desi 3) Reco	 To familiarize the student with issues and applications of ABA and behavioral consultation in Education and Business settings. Design skill acquisition programs based on the Statistical Assessment Recognize and provide examples of the elementary for verbal and nonverbal operant. 					
Expecte	d Course Outcomes	:				
CO1	To Understand the o	concept of Behaviour Analytics		K1, k	Κ2	
CO2	To Understand abou	it the Concepts of verbal and non-verbal Beha	aviour	K2, k	ζ3	
CO3	To Understand the S	Statistical Approaches to analyze Behaviour F	Pattern	s K3, k	ζ4	
CO4	Apply Exploratory	Data Analytics to find the Behavioural pattern	IS	K5,		
CO5	Design and Develop	Behavioural model using various Tools		K6, k	ζ3	
K1 - Re	member; K2 - Under	stand; K3 - Apply; K4 - Analyze; K5 - Evalua	ate; K6	6 - Create		
On the s	uccessful completion	of the course, student will be able to:				
TT . •4 . 1	D.L			10		
	Benaviour An		CI		nours	
operant behavio analyse- Behavio	Conditioning - Moo ur - Understanding improve- control - C ur.	dern Behaviourism - Personal Behaviour C Behavioural data- Self- Assessment: Reco Causal-Behavioural - Introduction Causal Dia	Change gnize- grams	Activity Define – (CD)- Bui	- Analyse Measure- ilding CD-	
Unit:2	Verbal Behavi	iour Sta <mark>tistical Approach</mark>		12	hours	
Differen Multiple Self-Edi Critical evaluatin	cesVerbalBehaviour: Variables - The Ma ting - Logical and S Listening Skills - Beh ng - Maintaining Gain	A Functional Analysis of Verbal Behaviou nipulation of Verbal Behaviour - The Produc cientific Verbal Behaviour – Thinking. Non avioural Activation Treatment - Brainstorm A - Strengthening behaviour Change.	ur - Co ction o -Verba ctivity	ontrolling V of Verbal b al behaviou SMART (Variables - ehaviour - ır: Basic - Goals - Re-	
Unit:3	Statistical Apr	proach		12	hours	
A/B Exp Funnel Convers - Predic Understa	A/B Experimentation – A/B test Types -Statistical Approach - A/B testing Mistakes – Challenges - Funnel Analysis – Event Properties - Conversion Drivers - Purchase Conversion Funnel -Cart Conversion Funnel -Custom Event Funnel-Campaign Conversion Funnel - Cohort Analysis - Predictive Cohorts - Behavioral Cohorts - Feature Adoption - Improving Advertising Performance - Understanding Seasonal					
TT 94 4	Transford P	hata Amalatias	<u> </u>	1.4	b	
Unit:4	Exploratory D	ata Analytics		12	nours	
Explorat Missing Types- (Learning	Exploratory Data Analytics- data Exploration -Feature Engineering – Data Cleaning – Preprocessing – Missing values – Imputation- Smoothing - Normalization – Imbalance Classes- Sampling - Sampling Types- One-hot Encoding - Summary Statistics – Automated EDA: Data Explorer Package - Ensemble Learning					

		M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affiliated Colleg	ges - Annexure No.29C			
Unit	:5	Vintage AnalysisSCA	A DATE D2-18 houro 23			
Vintag	ge Ana	ysis - Behavior Analysis: Organization - E-commerce - Use Ca	ses: Health behavior			
Chang	Change – Dataset – Tools: Adobe's funnel analysis product -Google Analytics- Heap Mixpanel					
Repor	t – Das	hboard				
Unit	:6	Contemporary Issues	2 hours			
Exper	t lectur	es, online seminars – webinars				
		Total Lecture hours	60 hours			
Text	Books	:				
1	Chase	, P. N., and Smith, J. M. (1994). Performance Analysis: Understand	ding Behavior in			
	Organ	izations. Morgantown, WV: Envision Development Group, Inc., Pu	ublishers.			
2	Danie	ls, A. C., and Daniels, J. (2004). Performance Management: Cha	anging Behavior That			
	Drives	Organizational Effectiveness (4thed.). Tucker, GA: Perfor	mance Management			
	Public	ations.				
Refer	ence B	ooks				
1	Floren	t Buisson, "Behavioral Data Analysis with R and Python", (2021), P	ublished by O'Reilly			
	Media	a, Inc., 2021.	_			
D L (

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

S.No	Course Title	Duration	Provider
1.	Behavioral Analytics (Free)	5 Lectures	Coursera
2.	Applied Behavioural Analysis (ABA)	2 hours	Udemy
3.	Behavioral Psychology Courses: Leadership and organizational behavior	4 Weeks	edX
4.	Applied Behavior Analysis - Foundation Course	2 hours	Udemy
Cours	e Designed by: Prof. Dr. V. Bhuvaneswari		
	S Photos B		

Mappir	Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO1	S	S	S	-	THE INCOME	-	М	М	М	М	
CO2	М	М	М	S	-	-	S	S	S	S	
CO3	S	S	S	S	М	М	S	S	S	S	
CO4	S	S	S	S	М	S	М	S	S	S	
CO5	S	S	S	S	S	S	S	S	S	S	

*S-Strong; M-Medium; L-Low

		INTERNET OF THINGS	L	Т	Р	С
Core/Elective/	Supportive	Elective	4			4
Pre-requisite		Basic knowledge of hardware,	Sylla	bus	202	3-
		Programming in C	Version 20		2024	4
Course Object	tives:					

The main objectives of this course are:

1. To gain insight about the architecture and enabling technologies of Internet of Things

2. To understand Arduino micro controller and IDE

3. To develop simple IoT Applications for different domains Page 49 of 57

Expecte	d Course Outcomes:	SCAA DATED: 1	8.05.2023
On the su	accessful completion of the course, student will be able to:		
CO1	To learn the importance of smart objects and smart environment	K	.1
CO2	To understand and use the microcontroller and various sensors	K	2
CO3	To create programs using Arduino IDE and extract data	K	3
CO4	To perform WiFi data communications, remote data storage in c	loud, and K	K3, K4
	handle the data using web applications		
CO5	To identify potential problems and develop solutions using IOT	K	5, K6
K1 - Rer	nember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evalu	ate; K6 – Create	

Unit:1	Introduction to IOT	10 hours				
Introduction to IOT - Enabling technologies of IOT - AI and Machine Learning - Physical and logical						
design of IoT - IOT Reference Architecture - IOT Functional Architecture - IoT levels and deployment						
templates - Application domains of IoT: Home automation - Cities - Environment - Energy - Industry						
- Agriculture -	Transportation - Health care & Lifestyle.					

Unit:2	Basic Electronics for IoT & Arduino IDE	12 hours					
Understanding basic electronic components and power elements Electric Charge, Resistance, Current							
and Voltage - Resistors, Capacitors, Diodes, LED, Potentiometer, circuit boards - Analog and digital							
circuits - Micro	ocontrollers – Electronic Signals – A/D and D/A Conversion – Pulse	Width Modulation					
Arduino IDE: I	nstallation and Set-up - Programming Fundamentals with C using Ar	duino IDE Program					
Structure in C -	 Basic Syntax - Data Types / Variables / Constants - Operators, Con 	ditional Statements					
and Loops - Us	ing Arduino C Library functions for Serial, delay and other invoking	g functions.					
Unit:3	Arduino Microcontroller and sensors	12 hours					
Working with Arduino: LED and Switch - Data acquisition with IOT Devices - Understanding Sensors							
and Devices - Understanding the Inputs from Sensors - Working with Temperature Sensors - Working							
with Ultrasoun	d Sensor -Working with humidity sensor - Working with Motion Ser	nsor - Working with					

IR Sensor - Working with Proximity Sensor - Working with Accelerometer and vibration sensor.

		1	M.Sc. Da	ata Analy	ytics w.e	.f. 2023-	24 onwa	urds - Af	filiated C	Colleges	- Annexu	tre No.29C
Uni	t:4	1	Medical	Sensors	and Act	tuators		_		SCAA I	DATED:	1206.00283
Und	Understanding Medical Sensors: Flow Sensor - Optical Sensor - Body Temperature Sensor - Blood											
Pres	ssure .	Sensor	-Airflow	sensor (breathin	g) - Patie	ent positi	ion sense	or (accele	erometei	r) - Pulse	and
oxy	gen 1	n blood	sensor (S	SPO2) -	Galvanic	skin res	sponse (C	JSR - SW	veating) s	sensor.		.
Unc	lersta	anding th	ne Outpu	ts throug	gh Actua	tors - Ac	tivating	LED L1g	shts - Ac	tivating	Relays - A	Activating
Buz	zer -	Kunnin	g DC Mo	DIOTS - K	unning S	stepper N	lotors ar	id Servo	Motors.			
Uni	t:5]	Data Co	mmunic	ation fro	om IOT	devices					12 hours
Bui	lding	and Us	ing Con	nmunicat	tion Dev	ices to t	ransfer d	lata fron	n IOT D	evices -	Understa	anding the
Con	nmur	nication	Principle	es to Trar	nsfer the	data fror	n IOT D	evices; U	Jsing WI	FI to Tra	ansfer the	data from
IOT	Sen	isor; Pro	grammiı	ng Funda	amentals	with W	eb Appl	lications	for hand	dling Da	ta Comn	nunication
fron	n IO	Γ Device	e; Remot	e Comm	unicatio	n to clou	ld/extern	al applic	ation .			
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Uni	t:6		Contemp	porary I	ssues							2 hours
Exp	ert le	ectures, o	online se	minars –	- webina	rs						
								Total L	ecture h	ours		60 hours
Tex	t Bo	ok(s)								·		
1	Arsl	hdeepBa	hga, Vij	ay Madi	setti, 'Int	ternet of	Things:	A Hands	s-On Apj	proach',	Universi	ties Press,
2	201.	J.				1 E		1 T 1.		1-4'		
2	Bor	1s Adrya	in, Domi		maier, Pa	aul Frem	antie, 1	ne Tech	nical Fol	indation	S OI 10 I	,
2	Arte	$\frac{1}{1}$		sners, 20	$\frac{11}{1}$	1 12 2 1	F 197	OID 111	N. 11	2012		
3	Mic	nael Ma	rgolis, "	Arduino	Cookbo	ok" 2nd	Edition,	OReilly		2012.		
4	Mar	co Schw	vartz, 'In	ternet of	Things	with ESI	28266,1	Packt Pu	blishing,	2016.		
					- S	100		<u>5</u> .	9			
Ref	eren	ce Book	S	M	156	a formation						
1	Cha	rles Plat	t, "Make	e Electro	nics – Le	earning b	y discov	ery", O	Reilly M	ledia, 20	15.	
2	Mic	hael Mi	ller, "The	e Interne	t of Thir	ngs", Pea	rson Ind	ia, 2015.				
						Contra Co		SU .				
Rel	ated	Online	Content	s [MOO	C, SWA	YAM, I	NPTEL,	Websit	es etc.]			
1	Intr	oductior	n to IOT,	https://n	ptel.ac.ir	n/courses	/106/10	5/106105	5166/			
I					•							
Cov	ırse I	Designed	By: Pro	of. Dr. T	. Amud	ha						
Mapping with Programme Outcomes												
С	Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
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*S-Strong; M-Medium; L-Low

	DEEP LEARNING	L	Т	Р	C
Core/Elective/Supportive	Elective	4			4
	Page 51 of 57				

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Pr	e-requisite	Nil	Version	2024		
Cou	rse Objectives:					
The	main objectives of this course	e are to:				
	1. To understand the fundar	nental concepts of Deep Learning.				
	2. To understand the concept	ots of Deep Learning Categories.				
	3. To understand and apply	Deep Learning concepts in real-time	е.			
Exp	ected Course Outcomes:					
On	the successful completion of	the course, student will be able to:				
1	Understand the structure and	d model of Deep Learning		K2		
2	Understand the concepts of	Neural Network and its type.		K3		
3	Understand and create work	station models using Python/tensor	flow	K4		
4 Understand and apply concepts of Deep Learning and Deep generative model.						
K1	- Remember; K2 - Understar	nd; K3 - Apply; K4 - Analyze; K5 -	Evaluate; K6– Creat	te		
Un	it:1 Introduction: Deep	Learning		12 hours		
Intro	oduction to Deep Learning: l	Fundamentals of Deep Learning- A	rtificial Intelligence	- Machine		
Lear	rning – Learning process of ne	ural Network - representation data -	Methodology of De	ep Learning		
- D	ata representation of Neural	Networks – tensor operations –	Gradient based opt	imization -		
Bac	kpropagation components –	Model Parameterization – Deep Le	earning hyperparame	eter – basic		
cont	figuration.	a controllation of				
T.I		and a second sec		10 h		
Un Ame	iit:2 Neural Network	Lature duction Karnes Catting un	Deen Learning We	10 nours		
Ana Fun	domontals of Machina Loarni	Introduction Keras - Setting up	Models Data Pror	recogning		
Full	ure Engineering – overfitting	- Underfitting - Workflow of Mach	vine Learning	Tocessing –		
1 Cat		- Childenhang worknow of Mach	ine Learning.			
Un	it:3 Classification of Net	ura <mark>l Network</mark>		12 hours		
Fee	dforward Networks: Multila	yer Perceptron, Gradient Descent, Ba	ackpropagation, Emp	irical Risk		
Min	imization, regularization, aut	toencoders - Regularization for De	ep Learning, Optim	ization for		
Trai	ning Deep Models	POLICATE TO ELEVAN				
Con	volutional Networks: The C	onvolution Operation - Variants of t	he Basic Convolution	n Function		
- St	ructured Outputs - Data Type	es - Efficient Convolution Algorithm	ns - Random or Un	supervised		
Feat	Features- LeNet, AlexNet					
Rec	Recurrent Neural Networks: Bidirectional RNNs - Deep Recurrent Networks Recursive Neural					
Netv	works - The Long Short-Term	Memory and Other Gated RNNs				

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Uni	t:4 De	eep Gen	erative N	Iodels					SCAA D	ATED: 1128.11502023
Deep	Deep Generative Models: Boltzmann Machines - Restricted Boltzmann Machines - Introduction to									
MCM	MCMC and Gibbs Sampling- gradient computations in RBMs - Deep Belief Networks- Deep									
Boltz	mann Mao	chines A	pplication	ons: Larg	ge-Scale	Deep L	earning -	- Compu	iter - Spe	eech Recognition -
Natu	ral Langua	ge Proce	essing - (Other Ap	plicatior	ns				
Uni	t: 5 D	eep Lea	rning: P	ractice						12 hours
Deep	Learning	for Com	puter Vi	sion – T	raining o	convents	– Pretra	ined con	ivnet – V	isualizing convnet
- Wo	rking with	text dat	a – Usin	g word e	mbeddir	igs – Fur	nctional A	API – Te	ext genera	ation with LSTM –
Imple	ementing I	Deep Dre	eam in K	eras.						
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Uni	t:6 C	ontempo	orary Iss	sues						2 hours
Expe	rt lectures	online s	eminars	– webin	ars					
LAPC		onnic a	semmar s	- webiii	ars		Total	[.ecture	hours	60 hours
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1	Abraham	Silberch	latz, Hen	ry K.Foi	th, Sudh	arshan,	"Databas	e system	n Concep	ots", 7th edition,
2	McGraw	H111, 202	$\frac{20.}{100}$	(1 D	1 0		۸ 1	1	A 1 .	2 1 E 1' <i>4</i> '
2	Prabu C.S.	S.R, "Ob	ject-Orie	ented Da	tabase Sy	ystems: A	Approact	nes and A	Architect	ures" 3rd Edition,
2	PHI, 2011	 1			Cha Daf	nitire C		1 T 1:4:		Ily Madia ICDN.
3	Kristina C	nodorov 54461	N, MOI	Igodb:	I ne Dell	nitive G	uide, sr	a Eanior	n, O'Rei	ily Media, ISBN:
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1	Shamkant	B.Navat	ne, Ram	ezelams	ri Funda	amentals	of Datat	base Syst	tems", /t	in Edition, Pearson
2	Education		1, 2017.	a harara	E al a a Dh	T	Vienne II.	1	"The D	afiniting Carida to
Z	David Ho MongoDI	DWS, PE DWS, PE	dition	horey,	D15	igge, I	iinin Ha	lwkins,	The D	eminive Guide to
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3	GauravVa	uish ,"Ge	etting Sta	arted wit	h NoSQI	_"Packt	Publishir	ng, 2013	•	
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4	Ian Good	fellow, Y	/oshuaB	engio, A	aron Co	urville, "	Deep Le	arning",	MIT Pre	ess, 2016.
	Contraction of the second s									
Relat	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]									
1. Deep Learning Specialization, <u>https://www.coursera.org/specializations/deep-learning</u>										
Course Designed By: Prof. Dr. V. Bhuvaneswari										
Manni	Manning with Programme Outcomes									
COc	P∩ 1	ΡΟ		PO 1	PO5	POA	P07	PUs	POO	Ρ Ω10
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CO4	S	S	S				
CO5	S	S	S				
*S-Strong; M-Medium; L-Low							

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		SOCIAL MEDIA MINING	L	Т	Р	С
Core/Electiv	e/Supportive	Elective Page 53 of 57	4			4
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Course Objectives: The main objectives of this course are to: 1. To understand how accurately analyze voluminous complex data set in social media and other sources 2. To understand how accurately analyze voluminous complex data set in social media and other sources Survest Contherstand social behavior and recommendation challenges and methodologies Expected Course Outcomes: On the successful completion of the course, student will be able to: 1 Understand and apply algorithms to model data using graph and network structures and recommendations K1, K2 2 Understand and apply algorithms to model data using graph and network structures and recommendations K2,K5 4 Brief on algorithms on social data diffusion and apply for various domains precific applications for data modelling and information diffusion, Evaluate the algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K4,K5,K6 Social Media Mining 12- hours Social Media Mining 12- hours Social Media Mining 12- hours Numers of Graph Notecules – Interactions – Social Media mining Charge Cargho Social Communities – Orapute Carghs – Sub graphs – Planar Graphs – Baiscis – Nodes - Edge	Pre	-requis	site	Nil	Syllabus Version A202	D2084 05.2023			
The main objectives of this course are to: 1. To understand how accurately analyze voluminous complex data set in social media and other sources 2. To understand the models and algorithms to process large data sets 3. To understand social behavior and recommendation challenges and methodologies Expected Course Outcomes: On the successful completion of the course, student will be able to: 1 Understand the concepts of Graph Models, social communities K1, K2 2 Understand and apply algorithms to model data using graph and network structures and recommendations K3 3 Understand and apply algorithms to model data using graph and network structures and recommendations K2,K5 4 Brief on algorithms on social data diffusion and apply for various domains K2,K5,K6 5 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 Create Unit:1 Social Media Mining Introduction Arons Molecules - Interactions Social Media mining Challenges - Graph - Basics - Nodes - Edges - Degree of Distribution- Types - Directed - Undirected - Weighted - Graph Connectivity - Tress and Porests - Bipartite graphs - Complete Graphs - Sub graphs - Planar Graphs - Graph Representation - Graph Truerestal Algorithms - Shorte	Cou	rse Obj	jectives:		· ·				
Sources Counderstand social behavior and recommendation challenges and methodologies Expected Course Outcomes: On the successful completion of the course, student will be able to: I Understand the concepts of Graph Models, social communities K1, K2 Understand the network models and measures to evaluate information K3 Understand and apply algorithms to model data using graph and network structures and recommendations K2,K5 Brief on algorithms on social data diffusion and apply for various domains K2,K3, K4 Brief on algorithms on social data diffusion and apply for various domains K2,K3, K4 Brief on algorithms on social data diffusion, Evaluate the algorithms for metrics K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create Unit:1 Social Media Mining I2 hours Social Media Mining - Introduction - Atoms - Molecules - Interactions - Social Media mining Challenges - Graphs - Basics - Nodes - Edges - Degree of Distribution: Types -Directed - Undirected Weighted - Graphs - Graphs - Graphs - Begorithms - Frins - Bipartite graphs - Complete Graphs - Sub graphs Distribution - Graph Traversal Algorithms - Mortest path algorithm Dikstra's - Spanning tree algorithms - Prins - Bipartite matching - Ford-Fulkerson algorithm Dikstra's - Spanning tree algorithms - Prins - Bipartite matching - Ford-Fulkerson algorithm Unit:2 Network Models Network Models - Measures - Node - Edges Coefficient - Jaccard - Case Study : -Modeling simal network with read world model Unit:3 Social Media Communities - Member based Detection - Node degree - Node Social Media Communities - Social Communities - Member based Detection - Node degree - Node Similarity - assortativity - Social Forces - Influence neages - Models Lor- hours Social Media Communities - Member based Detection - Node degree - Node Social Media Communities - Social Forces - Influence neagorid Lowers Social	The 1	main ol . To u	bjectives of this c inderstand how a	ourse are to: accurately analyze voluminous com	plex data set in social n	nedia and other			
3. To understand social behavior and recommendation challenges and methodologies Expected Course Outcomes: 0 no the successful completion of the course, student will be able to: 1 Understand the concepts of Graph Models, social communities K1, K2 2 Understand the network models and measures to evaluate information K3 3 Understand and apply algorithms to model data using graph and network structures and recommendations K2,K5 4 Brief on algorithms on social data diffusion and apply for various domains K2,K5,K4 5 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K4,K5,K6 K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create Unit:1 Social Media Mining 12- hours Social Media Mining - Introduction - Atoms - Molecules - Interactions - Social Media mining Challenges - Graphs - Basics - Nodes - Edges - Degree of Distribution - Types -Directed - Undirected - Weighted - Graph Connectivity - Tress and Forests - Bipartite graphs - Complete Graphs - Sug graphs Bipartites raphs - So raph Representation - Graph Traversal Algorithms - Shortest path algorithms bijkstra's - Spanning tree algorithms - Prims - Bipartite matching - Ford-Fulkerson algorithm Unit:2 Network Models 12- hours Network Models - Measures - Node : Eigen Centrality - Page Rank - Gro	2	sources 2. To understand the models and algorithms to process large data sets							
Expected Course Outcomes:	3	. To u	nderstand social	behavior and recommendation challe	enges and methodologies				
On the successful completion of the course, student will be able to: K1, K2 1 Understand the concepts of Graph Models, social communities K1, K2 2 Understand the network models and measures to evaluate information K3 3 Understand and apply algorithms to model data using graph and network structures and recommendations K2,K5 4 Brief on algorithms on social data diffusion and apply for various domains K2,K3, K4 5 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K4,K5, K6 6 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics Social Media Mining 12 hours Social Media Mining Introduction – Atoms – Molecules – Interactions – Social Media mining Challenges - Graphs - Basics – Nodes – Edges – Degree of Distribution - Types –Directed – Undirected – Weighted - Graph Connectivity - Tress and Forest – Biparitic graphs – Complete Graphs – Sub graphs Dijkstra's - Spanning tree algorithms – Prims - Biparite matching - Ford-Fulkerson algorithms Shorest path algorithms Vinit:2 Network Models 12 hours Network Models – Measures – Node : Eigen Centrality – Page Rank – Group Measures – Betweenness centrality – group degree centrality, cantogrup – Closeness centrality – Strugt and	Expe	ected C	ourse Outcomes	s:					
1 Understand the concepts of Graph Models, social communities K1, K2 2 Understand the network models and measures to evaluate information K3 3 Understand and apply algorithms to model data using graph and network structures and recommendations K2,K5 4 Brief on algorithms on social data diffusion and apply for various domains K2,K3,K4 5 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K4,K5,K6 K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Creat Unit:1 Social Media Mining Social Media Mining Introduction Atoms - Molecules - Interactions - Social Media mining Challenges - Graphs Basics - Nodes - Edges - Degree of Distribution - Types -Directed - Undirected - Weighted - Graph Connectivity - Tress and Forests - Bipartite graphs - Complete Graphs - Sub graphs a plasart Graph - Sub graphs - Basics - Nodes - Edges - Degree of Distributions - Types - Directed - Undirected - Weighted - Graph Connectivity - Tress and Forests - Bipartite matching - Ford-Fulkerson algorithms brights a 's Spanning tree algorithms Prims - Bipartite matching - Ford-Pulkerson algorithms - Shortest path algorithms brights a 's Spanning tree algorithms - Prims - Bipartite matching - Ford-Walkerson algorithms - Transitivity - Group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior - Transitivity and reciprocity - Linking Analysis - Cluster coefficien - Jaceaf - Case Study : -Modeling smal networks with real worl	On	the suc	cessful completion	on of the course, student will be able	to:				
2 Understand the network models and measures to evaluate information K3 3 Understand and apply algorithms to model data using graph and network structures and recommendations K2,K5 4 Brief on algorithms on social data diffusion and apply for various domains K2,K3,K4 5 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K4,K5, K6 K1 Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create Unit:1 Social Media Mining 12 hours Social Media Mining - Introduction - Atoms - Molecules - Interactions - Social Media mining Challenges - Graphs - Basics - Nodes - Edges - Degree of Distribution - Types -Directed - Undirected - Weighted - Graph Connectivity - Tress and Forests - Bipartite graphs - Complete Graphs - Sub graphs - Planar Graphs - Graph Representation - Graph Traversal Algorithms - Shortest path algorithms Dijkstra's - Spanning tree algorithms - Prims - Bipartite matching - Ford-Fulkerson algorithm Unit:2 Network Models - Node : Eigen Centrality - Page Rank - Group Measures - Betweenness centrality - group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior - Transitivity and reciprocity - Linking Analysis - Cluster coefficient - Jaccard - Case Study :-Modeling similarity - Node reachability - Group Based detection methods - balanced - robust - modular - dense - hierarchical - Spectral Clustering: Balanced Communities - Member based Detection - Node degree - Node Similarity - Node leasenes	1	Under	stand the concept	ts of Graph Models, social communi	ties	K1, K2			
3 Understand and apply algorithms to model data using graph and network structures and recommendations K2,K5 4 Brief on algorithms on social data diffusion and apply for various domains K2,K3,K4 5 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K4,K5,K6 6 Distinguish and Suggest the appropriate algorithms for domain specific for metrics K4,K5,K6 7 Social Media Mining 12- hours Social Media Mining Introduction Atoms Social Media Mining Introduction Atoms Challenges - Graph S - Basics – Nodes - Edges - Degree of Distribution Types – Directed – Undirected Weighted - Graph Connectivity - Tress and Forests - Biparite graphs – Complete Graphs – Sub graphs = Planar Graphs - Graph Representation - Graph Traversal Algorithms – Shortest path algorithms Distributions Shortest path algorithms Unit:2 Network Models 12- hours Network Models – Measures – Node : Eigen Centrality – Page Rank – Group Measures – Betweenness centrality - group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior - Transitivity and reciprocity - Linking Analysis - Cluster coefficient – Jaccard - Case Study : -Modeling similarity – Node reachability - Group Based detection methods - balanced – robust - modular – dense - hierarchical – Spectral Clustering : Bal	2	Under	stand the networ	k models and measures to evaluate in	nformation	K3			
4 Brief on algorithms on social data diffusion and apply for various domains K2,K3, K4 5 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K4,K5, K6 K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create Unit:1 Social Media Mining 12- hours Social Media Mining Introduction - Atoms - Molecules - Interactions - Social Media mining Challenges - Graphs - Basics - Nodes - Edges - Degree of Distribution - Types -Directed - Undirected - Weighted - Graph Connectivity - Tress and Forests - Bipartite graphs - Complete Graphs - Sub graphs - Planar Graphs - Graph Representation - Graph Traversal Algorithms - Shortest path algorithms Dijkstra's - Spanning tree algorithms - Prims - Bipartite matching - Ford-Fulkerson algorithm 12- hours Network Models Network Models 12- hours Network Models I2- hours Network Models Unit:3 Social Media Communities Croup Measures - Betweenness centrality - group degree centrality, entrality, and group - Closeness centrality - Node Linking Behavior - Transitivity and reciprocity - Linking Analysis - Cluster coefficient - Jaccard - Case Study : -Modeling small networks with real world model 12- hours Social Media Communities Social Communities - Member based Detection - Node degree - Node Similarity - Node reachability - Group Based detection methods - balanced - robust - modular - dense - hierarchical - Spectral Clustering : Balanced Com	3	Under and re	stand and apply a commendations	algorithms to model data using graph	n and network structures	K2,K5			
5 Distinguish and Suggest the appropriate algorithms for domain specific applications for data modelling and information diffusion, Evaluate the algorithms for metrics K4.K5, K6 K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create Unit:1 Social Media Mining 12 hours Social Media Mining Introduction – Atoms – Molecules – Interactions – Social Media mining Challenges - Graphs - Basics – Nodes – Edges – Degree of Distribution- Types –Directed – Undirected – Weighted - Graph Connectivity - Tress and Forests – Bipartite graphs – Complete Graphs – Sub graphs – Planar Graphs - Graph Representation - Graph Traversal Algorithms – Shortest path algorithms Dijkstra's - Spanning tree algorithms – Prims - Bipartite matching - Ford-Fukerson algorithm Unit:2 Network Models Network Models Unit:3 Social Media Communities Social Media Communities Unit:3 Social Media Communities – Member based Detection – Node degree – Node Similarity – Node reachability - Group Based detection methods - balanced – robust - modular – dense – hierarchical - Spectral Clustering : Balanced Community	4	Brief	on algorithms on	social data diffusion and apply for v	various domains	K2,K3, K4			
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create Unit:1 Social Media Mining 12 hours Social Media Mining - Introduction - Atoms - Molecules - Interactions - Social Media mining Challenges - Graphs - Basics - Nodes - Edges - Degree of Distribution - Types - Directed - Undirected - Weighted - Graph Connectivity - Tress and Forests - Bipartite graphs - Complete Graphs - Sub graphs - Planar Graphs - Graph Representation - Graph Traversal Algorithms - Shortest path algorithms Dijkstra's - Spanning tree algorithms - Prims - Bipartite matching - Ford-Fulkerson algorithm Unit:2 Network Models 12 hours Network Models - Measures - Node : Eigen Centrality - Page Rank - Group Measures - Betweenness centrality - group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior - Transitivity and reciprocity - Linking Analysis - Cluster coefficient - Jaccard - Case Study : -Modeling small networks with real world model Unit:3 Social Media Communities Netmork Social Media Communities - Social Communities - Member based Detection - Node degree - Node Similarity - Node reachability - Group Based detection methods - balanced - robust - modular - dense - hierarchical - Spectral Clustering : Balanced Community algorithm Community Evolution - Evaluation. Unit:4 Social Network - Information Diffusion - Types - herd behavior - Information Cascades diffusion of innovation - epidemics - Diffusion Models Case Study - Herd Behavior - Information Cascades diffusion of innovation - epidemics - Diffusion Models Case Study - Herd Behavior - Information Cascades diffusion of innovation - Secial Similarity - assortativity - Social Forces - Inf	5	Distin applic for me	guish and Sugg ations for data me etrics	gest the appropriate algorithms odelling and information diffusion, H	for domain specific Evaluate the algorithms	K4,K5, K6			
Unit:1Social Media Mining12 hoursSocial Media Mining. Introduction – Atoms – Molecules – Interactions – Social Media miningChallenges -Graphs - Basics – Nodes – Edges – Degree of Distribution – Types –Directed – Undirected– Weighted -Graph Connectivity - Tress and Forests – Bipartite graphs – Complete Graphs – Sub graphs– Planar Graphs -Spanning tree algorithms – Prims - Bipartite matching - Ford-Fulkerson algorithms– Dijkstra's -Spanning tree algorithms – Prims - Bipartite matching - Ford-Fulkerson algorithms– Unit:2Network Models12 hoursNetwork Models -Network Models– Transitivity - group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior- Transitive - Node 2• Transitivity - group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior- Transitive - Social Media Communities – Member based Detection – Node degree - NodeSocial meditize -Social Media Communities – Member based Detection – Node degree - Node- NodeSimilarity -> Social Media Communities – Member based Detection – Node degree - Node- NodeSimilarity -> Social Media Communities – Member based Detection – Node degree - Node- NodeSocial meditize -> Social Communities – Member based Detection – Node degree - Node- NodeSocial Network10 hours- Social Network10 hoursSocial Network -Information Diffusion – Types - herd behavior - information cascades Methods- Social Media Recommendation Of- Social Network -Information Diffusion – Types - herd behavior -	K1	- Reme	ember; K2 - Unde	erstand; K3 - Apply; K4 - Analyze; I	K5 - Evaluate; K6 – Crea	ate			
Social Media Mining - Introduction Atoms Molecules - Interactions Social Media mining Challenges - Graph S Basics Nodes Edges Degree of Distribution- Types - Directed - Undirected - Weighted - Graph Connectivity - Tress and Forests - Bipartite graphs - Complete Graphs - Sub graphs - Planar Graphs - Graph Representation - Graph Traversal Algorithms - Shortest path algorithms Dijkstra's - Spanning tree algorithms - Prims - Bipartite matching - Ford-Fulkerson algorithm Unit:2 Network Models - Neasures - Node - Betweenness Network Models - Measures - Node : Findenasures - Betweenness centrality - group degree centrality, centrality, and group - Closeness centrality - Node Linking Behavior - Transitivity and reciprocity - Linking Analysis - Cluster coefficient - Jaccard - Case Study : - Modelig - Modelig Unit:3 Social Media Communities - Sucial Community = Clustering : Balanced Community algorithm Community Evolution - Evaluation. Unit:4 Social Network 10- hours Social Network - Information Diffusion Models Case Study - Herd Behavior - Information Cascades diffusi	Uni	it:1	Social Media M	Aining		12 hours			
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Unit:6Contemporary Issues2 hoursExpert lectures, online seminars – webinars Page 54 of 57Page 54 of 57	Reco Meth User – Co	ommenc ods- C friends mmuni	lation Vs Search ollaborative Filte hip – Recommer ty behavior – Use	– Recommendation Challenges – Re ering – Memory Based – Model Ba ndation Evaluation – Precision – Rec er Entity behavior – Behavioral Anal	ecommender algorithms - sed – Social Media Rec call – Behavioral– User F lytics - Methodology	Content-Based ommendation – Behavior – User			
Expert lectures, online seminars – webinars Page 54 of 57	Uni	i t:6	Contemporary	Issues		2 hours			
	Expe	ert lectu	res, online semin	hars – webinars Page 54 of 57					

CAA DATED: 68.05h0026s

Text Book(s)								
1	Reza Zafarani , Mohhammad AliAbbasi - Social Media Mining: An Introduction - Published by							
	Cambridge press, 2014 – (Free Ebook available http://dmml.asu.edu/smm/chapter)							
2	Memon, N., Xu, J.J., Hicks, D.L., Chen, H. (Eds.), Data Mining for Social Network Data- Springer							
	– Annals of Information Systems ,ISBN 978-1-4419-6287-4							
3	Lam Thuy Vo, 2019, "Mining Social Media: Finding Stories in Internet Data							
Ref	Reference Books : EBooks							
1	Matthew A. Russel and Mikhail Klassen, 2018, "Mining the Social Web: Data Mining Facebook,							
	Twitter, LinkedIn, Instagram, GitHub							
2	GungorPolatkan, AntonoisChalkiopoulos, P. Oscar Boykin et.al., 2018, "Social Media Mining and							
	Analytics.							

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]									
	Course Title	Duration	Provider						
1.	Social Media Data Analytics (Free)	4 Weeks	Coursera						
2.	Introduction to Social Media Analytics	4 Weeks	Coursera						
3.	Social Media Analytics: Using Data to Understand	3 Weeks	Future Learn						
	Public Conversations								
4.	4. Starting with social network analysis 2 hours Udemy								
Web link									

- 1. https://learn.g2.com/social-media-data-mining
- 2. https://www.javatpoint.com/social-media-data-mining
- 3. https://www.igi-global.com/dictionary/applying-critical-theories-to-social-media-mining-andanalysis/50376
- 4. https://www.cambridge.org/core/books/social-mediamining/introduction/75F143896832B7B9339F2CE663C4815B

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	М	М	L	-	LONCARE 1	D ILLIND'	S	S	L	-
CO3	L	S	-	М	S	-	Μ	L	М	L
CO3	S	М	Μ	-	М	L	L	-	-	М
CO4	-	L	Μ	S	L	-	-	-	-	-
CO5	S	М		-	-	L	-	L	М	S

		VIRTUALIZAITON AND CLOUD	L	Т	Р	С
Core/Elective/	Supportive	Elective	4			4
Pre-requisite		Basic knowledge of data storage,	Syllabus		2023-	
		Client – Server systems	s Version			
Course Object	tives:					

M.Sc. Data Analytics w.e.f. 2023-24 onwards - Affiliated Colleges - Annexure No.29C									
The main objectives of this course are:SCAA DATED: 18.05.2023									
1. To in	1. To impart knowledge on the concepts of distributed systems, cloud computing and AWS								
2. To ga	in knowledge over various virtualization and virtual machines								
3. To ga	in understanding about the data centers								
Expecte	l Course Outcomes:								
On the su	accessful completion of the course, student will be able to:								
CO1	Understand the fundamentals of distributed systems	K2							
CO2	Understand and use the cloud services and AWS	K3							
CO3	Understand and perform virtualization	K3, K6							
CO4	To create, configure and manage virtual machines	K4							
CO5	Understand about data center	K5							
K1 - Rer	nember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Cr	reate							
Unit:1	Distributed Systems	12 hours							
Introduct	ion to distributed systems - Distributed algorithm - Distributed Data Sto	ores - Distributed							
Computi	ng - File Systems - Distributed Messaging - Distributed Applications - Distri	buted Transaction							
- Paralle	and distributed computing - Applications.								
Linit.2	Cloud Computing	12 hours							
	Cloud Computing								
	istics, three service models, Four deployment models. Depetite of Cloud Computing -	ud - five essential							
Vandore	Traditional Infrastructure actus and Challenges AWS	omputing - Cloud							
vendors - Traditional Intrastructure setup and Challenges – AWS.									
Unit:3	Virtualization	12 hours							
Virtualization: Introduction to vSphere and the Software - Defined Data Center - Creating Virtual									
Machines - VCenter Server - Configuring and Managing - Virtual Networks - Configuring and Managing									
Virtual S	torage - Virtual Machine Management - Resource Management and Monitorin	ng.							
	State Infection								

Uni	Unit:4 Virtual Machines								12 hours		
Virt	Virtual Machines: vSphere HA - vSphere Fault Tolerance - Protecting Data vSphere DRS - Network										
Scalability - vSphere Update Manager and Host Maintenance - Storage Scalability - Securing Virtual											
Machines.											
Uni	Unit:5 Datacentre 10 hours										
Data centre: Data centre overview -Components - Provisions - Need of Data Centre - Data Centre											
Arc	hitec	ture - D	ifferent R	Racks - D	ata cente	er archite	cture for	cloud co	omputing	g - role o	f data centre in cloud
com	nputin	ng.									
Uni	t:6	(Contemp	porary I	ssues						2 hours
Exp	ert le	ectures,	online se	minars –	webina	rs					
F			Total Le	cture ho	ours						60 hours
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2	Cen	ter". 1st	Edition	Cisco P	ress. 201	1 age, 1	Cloud C	omputing	g. Auton	liating th	
3	Bria	in J.S.	Chee, C	urtis Fra	anklin J	r., "Clou	ud Com	puting:	Technol	ogies an	d Strategies of the
	Ubi	quitous	Data Cer	nter", 1st	Edition,	CRC P	ess, 201	0.		e	U
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1	And	lrew S.	Tanenba	um, Maa	rten Var	n Steen,	"Distrib	uted Sys	tems: Pr	rinciples	and Paradigms", 2 nd
n	editi	thow De	atespace	Indepen	dent Pub	olishers, 2	$\frac{2016}{2^{nd}}$ oditi	ion Wild	Dubli	nation 20)16
Z	Iviai	lilew PC	nuloy,	viitualiza		sentials,		ion, whe	ey Public	ation, 20	J10.
Rela	ated	Online	Content	s [MOO	C. SWA	YAM. I	NPTEL.	Website	es etc.]		
1	Clo	ud Com	puting an	nd Distri	buted Sy	stems, h	ttps://np	tel.ac.in/	courses/	106/104/	/106104182/
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Manning with Programme Outcomes											
COs PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10								PO10			
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CO	2	-	S	М	S	-	-	-	-	-	-
CO3 - M S L L S - M						М					
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CO5 -		-	L	S	S	-	-	Μ	Μ	_	L