PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637018 (AUTONOMOUS) REGULATIONS 2023

Ph.D - Course Work Elective

S.No.	Course Code	Course Title	L	Т	P	C
1	PCR2301	Machine Learning Techniques	3	0	0	3
·2	PCR2302	Deep Learning Techniques	3	1	0	4
3	PCR2303	Data Analytics	3	0	0	3
4	PCR2304	Block Chain Technologies	3	0	0	3
5	PCR2305	Randomized Algorithms	3	0	0	3

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P	CR2301	MACHIN	E LEARNING TECHNIQUE	S	0	3
COU	RSE OBJECT	TIVES	*			
To ena	able the studer	ts to				
1	learn the va	rious regression method	ds.	2		
2	acquire the	knowledge in supervise	ed learning techniques			
3	gain the kno	wledge of ANN and G	enetic algorithm techniques			
4	impart the u	nsupervised learning te	echniques	,		
5	design appr	opriate ensemble learni	ng algorithms for problem solvi	ng		
UNI		TISTICAL THEORY			1 1)
Linear	methods for	Regression - Gauss-M	Markov theorem, Multiple regre	ession; Subset selection	i; Ric	lge
regres	sion; Principa	components regression	n; Partial least squares; Linear	discriminant analysis;	Logis	tic
regres	sion.			C 681		
UNI	T II SUPI	RVISED LEARNING	3		9)
Decisi	on Tree Lea	ning - Issues in Dec	cision tree Learning; Bayes	Theorem - Concept L	earnii	ng;
Maxin	num Likeliho	od; Minimum Descri	iption Length Principle; Bay	es Optimal Classifier	Gib	bs
Algori	thm; Naive Ba	yes Classifier; Bayesia	n Belief Network; EM Algorith	m.		
UNI	ГШ А	RTIFICIAL NEURA	L NETWORKS AND GENET	IC ALGORITHM	9)
Introdi	uction – Perce	ptron; Multilayer Netw	orks and Back Propagation Alg	orithm; Remarks on the	e Bac	k -
			or Function, Alternative Erro			
			ng; Genetic Algorithm.			
UNIT	r IV UNSU	JPERVISED LEARN	ING		9)
Associ	iation rules: (luster analysis: Self o	organizing maps; Principal con	nnonents curves and s	urfac	es.
			dent component analysis; Multio	•	urrac	сь,
					9)
UNI	/ / / ·		ENSEMBLE LEARNING			_
			Analysis of Random Forests; En	nsemble Learning Intro-	ductio	n;
Boosti	ng and Regula	rization Paths; Learnin	g Ensembles.			
				TOTAL PERIODS	4:	5
COUF	RSE OUTCO	MES				
At the	end of this co	urse, students will be at	ple to	BT Mapped (Highest Level)		
CO1	compare and	contrast about various	regression methods.	Understanding (K	2)	
CO2	illustrate var	ious supervised learnin	g algorithms.	Apply (K3)		
CO3	create and de	ploy deep neural netwo	ork applications.	Analyze (K4)		
CO4	synthesize th	a usaga of unsunamisa	d laarning algorithms	Apply (K3)		
	apply the ap	e usage of unsupervise	d fearning algorithms.	11 7 ()		

- 1. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (India) Private Limited, 2013.
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer; Second Edition, 2009.
- 3. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Second Edition, 2010.
- 4. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "An Introduction to Statistical Learning: with Applications in R", Springer; First Edition 2013.
- 5. Stephen Marsland, Machine Learning An Algorithmic Perspective, CRC Press Taylor &Francis Group, United States, Second Edition, 2015.

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

60	Programme Outcomes(POs)											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2				
CO1	2	1	2	2	0	1	3	2				
CO2	2	2	2	3	. 0	1	2	3				
CO3	3	2	3	3	1	2	3	3				
CO4	2	1	2	2	0	1	2	2				
CO5	3	2	2 .	3	0	1	2	2				



PCR230	02	DEEP 1	LEARNING TECHNIQUES		3	1	0	4
COURS	SE OBJECTIVE	S .						
To enabl	le the students to							
1	learn various p	arameters o	of deep learning model.					
2	study about fur	nctional cor	mponents of deep learning.					
3	acquire knowle	edge of deep	p learning algorithms.					
4	predict the use	s of CNN a	nd RNN.					
5	apply deep lear	rning Conce	epts					
UNIT I	I FOUNDAT	IONS OF I	DEEP LEARNING					12
Introduct	tion - Math bel	hind machi	ne learning: Linear Algebra, Statis	stics, Ma	chine	Learn	ing w	orks;
Logistic	regression; Ev	aluating M	Iodels; Neural Networks; Training	Neural	Net	works;	Activ	ation
functions	s; Loss functions	; Hyper par	ameters.					
UNIT I	I ARCHITEC	CTURAL D	DESIGN					12
Defining	g Deep Learning	— Comm	on Architectural Principles of Deep	Networ	ks: P	aramete	ers, La	ayers,
Activation	on functions, Lo	ss function	s, Optimization Algorithms, Hyper	paramete	ers; E	Building	g bloc	ks of
Deep Ne	etworks - RBMs,	Autoencode	ers, Variational Autoencoders.					
UNIT II	II TYPES OF							12
	II TYPES OF	DEEP NE	TWORKS					
			TWORKS Convolutional Neural Networks (CNI	Ns); Recu	urrent	Neural	Netw	1000000
Unsuper		Networks; (Convolutional Neural Networks (CN	Ns); Recu	urrent	Neural	Netw	1000000
Unsuperv Recursiv	vised pretrained	Networks; (ks; Applica	Convolutional Neural Networks (CN	Ns); Recu	urrent	Neural	Netw	1000000
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Unsuperv Recursiv UNIT IV Convolut	vised pretrained re Neural Networ V CNN AND I tional Neural N	Networks; (ks; Applica RNN Networks: A	Convolutional Neural Networks (CN)	ng with	Bato	eh Nor	maliza	rorks;
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- Josh Patterson and Adam Gibson, "Deep Learning A Practitioner's Approach", Ist Edition, O* Reilly Series, August 2017.
- 2. Indra den Bakker, "Python Deep Learning Cookbook", 1st Edition, Packt Publishing, October 2017.

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COs		Programme Outcomes(POs)									
COS	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2			
CO1	3	2	2	3	0	2	3	3.			
CO2	2	2	2	3	0	1	2	2			
CO3	2	1	2	2	1	1	2	2			
CO4	3	1	3	3	1	1	3	3			
CO5	3	2	3	3	1	2	3	3			



PCF	2303 DATA ANALYTICS		3	0	0	3
COURS	E OBJECTIVES					
To enab	e the students to					
1	introduce data analytics and preparing the data.					
2	impart knowledge on data summarization and v	isualization.				
3	familiar with the types of machine learning and	data streams.				
4	learn big data frameworks.					
5	learn the design of data analytics.				77. 3	
UNIT	I OVERVIEW OF DATA ANALYTICS					9
Data Ar	alytics Life Cycle; Different types of Data; Diff	ferent types o	f Data	Analytics;	Data A	nalytics
Challeng	es; Application areas of Data Analytics; Introducti	on to Big Dat	a, Chara	cteristics	of Big D	ata, Big
data eco	ystem.					
UNIT	II DATA PREPARATION	nakt e				9
Data Cl	eaning - Handle Missing Values, Handle Noise	and Outliers	s, Remo	ve Unwa	nted dat	a; Data
Transfor	mation - Aggregation, Normalization, Discretization	n, Concept hie	erarchy g	generation	; General	lization
Data Red	luction, Dimensionality Reduction, Numerosity Red	duction, Data	Compres	ssion.		
UNIT	II DATA SUMMARIZATION					9
Statistica	l data elaboration, Numerical Descriptive Measur	es - Central 7	Tendenc	y - Variat	ion and	Shape
Explorin	g Numerical Data - Numerical Descriptive Mea	asures for a	Populati	on - Cov	ariance	and th
	nt of Correlation - Summarizing Data through grap					
UNIT						9
		omobitootumos (Studen (Commuting	Compl	
	ion to Streams Concepts; Stream data model and am; Filtering streams; Counting distinct element					
	in a window; Decaying window; Real-time Analy					
	sentiment analysis, stock market predictions.	tics Platforni	(KIAP)	аррисано	ns, case	studies
	The state of the s					9
UNIT	W BIG DATA TOOLS					9
Need of	Big data tools - understanding distributed systems -	Overview of	Hadoop	comparin	g SQL da	ıtabase
and Had	oop Eco System - Distributed File System: HDFS, l	Design of HD	FS-writi	ng files to	HDFS, I	Readin
files from	HDFS.					
*			T	OTAL PI	ERIODS	45
COURS	E OUTCOMES					
At the er	d of this course, students will be able to			BT Ma		
CO1	prepare the data for further use.			(Highest		
CO2	apply the statistical analysis in big data.	2)		Understan		-)
CO2	understand and apply Supervised and Unsuperv	rised learning		Apply	y (K3)	
COS		iscu icarilling		Analyz	ze (K4)	
CO4	approaches.			95000 Som	U. 27 (24 (74 (24)	
CO4	understand Data stream mining concepts.				y (K3)	
CO5	understand big data frameworks.			Understar	iding (K2	2)

- Jure Leskovec, Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, 2019, 3rd edition, Cambridge University Press, New York.
- 2. Anderson D.R, Sweeney D.J, Williams T.A, (2019), Statistics for Business and Economics, 13th edition, Cengage Learning.
- 3. Bill Franks, Tamingthe Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analytics, 2012, 1st edition, John Wiley and sons, Hoboken, New Jersey.
- 4. Glenn J.Myatt, Making Sense of Data, 2011,2nd edition, John Wiley and Sons, Hoboken, New Jersey.
- Jiawei Han, MichelineKamber, Data Mining Concepts and Techniques, 2008, 2nd edition, Elsevier, India

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COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2				
CO1	2	2	2	2	1	1	3	3				
CO2	2	2	3	3	0	2	2	2				
CO3	3	2	3	3	1	2	3	3				
CO4	2	1	2	2	1	1	2	2				
CO5	2	1	2	3	1	1	3	2				



PCR2304	BLOCKCHAIN TECHNOLOGIES	3	0	0	3
COURSE C	DBJECTIVES			•	
To enable th	e students to				
1	study the basics of block chain technology.				
2	understand about bitcoin and cryptocurrency.				
3	learn the mechanisms of ethereum.				
4	know the basics of hyperledger and solidity programming.				
5	know about the applications of blockchain.	7-14-1	75		
UNIT I	INTRODUCTION OF CRYPTOGRAPHY AND BLOCK	CHAIN			9
Introduction	to Blockchain, Blockchain. Technology Mechanisms & N	etworks,	Blockch	ain. O	rigi
Objective of	Blockchain, Blockchain Challenges, Transactions and Blocks,	P2P Syster	ns, Keys	as Ide	enti
Digital Signa	atures, Hashing, and public key cryptosystems, private vs. public	Blockchai	n.		
UNIT II	BITCOIN AND CRYPTOCURRENCY				9
	to Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, N	Mining Dev	elopme	nts, Bi	-
	centralization and Hard Forks, Ethereum Virtual Machine (EVM		-		
	ockchain and Digital Currency, Transactional Blocks, Impact of				•
Cryptocurre				Ο.	,
UNIT III	INTRODUCTION TO ETHEREUM				9
	to Ethereum, Consensus Mechanisms, Metamask Setup, Ether	reum Acco	unte Tr	ansact	
100	thers, Smart Contracts.	cum ricco	unto, 11	ansacı	1011
UNIT IV	INTRODUCTION TO HYPERLEDGER AND SOLIDITY PR	ROGRAM	MING		9
					7
Introduction	to Hyperledger, Distributed Ledger Technology & its Challeng	es Hyperle		Dietril	
	to Hyperledger, Distributed Ledger Technology & its Challeng		edger &		oute
Ledger Tech	nology, Hyperledger Fabric, Hyperledger Composer. Solidity -	Language	edger & of Smar	t Cont	oute
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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

COs		Programme Outcomes(POs)									
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2			
CO1	3	2	3	3	1	2	3	3			
CO2	3	2	3	3	1	2	3	3			
CO3	3	2	3	3	1	2	3	3			
CO4	2	2	3	3	1	2	3	3			
CO5	3	2	3	3	1	2	3	3			



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COURSE	OBJECTIVES										
To enable	the students to										
1	understand the n	nathematic	al foundation	is needed fo	r unde	rstandin	g and de	signin	g algo	orithi	ns
2	expose the inequ	alities and	probabilistic	methods							
3	understand the c	oncept of r	andom walk	and Algebra	aic tecl	hniques					
4	expose the Data	Structures	and Graph al	lgorithms							
5	implement the Approximate counting and Parallel and distributed algorithms										
UNIT I	INTRODUC AND DEVIA	TIONS .									9
	on-Min-Cut Algo										
	, The Minimax										
Occupanc	Problems, M	arkov an	d Chebyshe	ev Inequal	ities,	Randor	mized S	Selecti	on,	Two	-point
Sampling,	Stable Marriage	Problem an	d Coupon Co	ollector's Pr	roblem						
UNIT II											9
Tail Inequ	alities-Chernoff	Bound, R	outing in a	parallel C	omput	er, A v	wiring P	robler	n, Ma	rting	ales;
The Prob	abilistic Method	- Overvie	w, Maximu	ım Satisfia	bility,	Expan	ding Gr	aphs,	Lova	sz L	ocal
Lemma an	d Method of Con	ditional Pro	babilities.								
UNIT III			MARKOV CHAINS AND RANDOM WALKS AND ALGEBRAIC TECHNIQUES								9
	TECHNIQUES Chains and Random Walks-A 2-SAT Example, Markov Chains, Random Walks on Grandom										
Markov C	hains and Rando	m Walks-	A 2-SAT Ex	xample, Ma	arkov (Chains,	Randon	ı Wal	ks on	Gra	phs,
Electrical	Networks, Cover	Times, Gr	aph Connect	ivity, Expar	nders a	and Rap	idly Mix	king R	andoi	n Wa	alks;
Electrical Algebraic		Times, Gr	aph Connect nd Freivalds	ivity, Expar Technique	nders a	and Rap	idly Mix olynomia	king R	andoi ntities	m Wa	alks;
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CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

CO			Pro	gramme Ou	tcomes(PO	s)		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	3	1	3	2	1	2	1	2
CO2	3	2	3	2	1	2	1	2
CO3	3	2	3	2	1	2	1	2
CO4	3	2	3	2	1	2	1	2
CO5	3	2	3	2	1	2	1	2

