Department of
Artificial Intelligence
and
Data Science

Minutes of 5th BOS Meeting

GD Hall, Training and Placement Cell
Sri Manakula Vinayagar Engineering College

16th September 2022 & 2:30 P.M

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SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

Department of Artificial Intelligence and Data Science
Minutes of 5th Board of Studies

The Fifth Board of Studies meeting for Department of Artificial Intelligence and Data Science was held on 16th September 2022 at 2:30 P.M in the GD Hall, Training and Placement Cell, Sri Manakula Vinayagar Engineering College with the Head of the Department in the Chair.

The following members were present for the BoS meeting

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS
1	Dr. J. Madhusudanan, Professor and Head, Department of AI&DS, SMVEC.	Chairman
2	Dr. M. Thangaraj, Professor & Head, Madurai Kamaraj University, Madurai.	Subject Expert (Academic Council Nominee)
3	Dr. Chandra Mouli P.V.S.S.R, Associate Professor & Head Central University of Tamil Nadu, Tiruvarur, Tamil Nadu.	Subject Expert (Academic Council Nominee)
4	Dr. C. Muthu, Professor & Head, Loyola College, Chennai.	Subject Expert (University Nominee)
5	Dr. Mohanraj Vengadachalam, Machine Learning Lead, Standard Chartered GBS, Chennai.	Representative from Industry
6	Dr. J. Uthayakumar, Research Head, Genesys Academy, Puducherry.	Postgraduate Alumnus (nominated by the Principal)
7	Dr. M.Auxilia Associate Professor, Department of AI&DS, SMVEC	Internal Member
8	Mr. K.Pragash Assistant Professor, Department of AI&DS, SMVEC	Internal Member
9	Mr. R.Rajan Assistant Professor, Department of AI&DS, SMVEC	Internal Member

1

B.Tech. – Artificial Intelligence and Data Science

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10	**Prof. M. Ganesan** Assistant Professor, Department of CSE, SMVEC	Internal Member
11	**Prof. M. Shanmugam** Assistant Professor, Department of CSE, SMVEC	Internal Member
12	**Dr. T. Gayathri** Professor, Department of Maths, SMVEC	Internal Member
13	**Dr. R. Sivakumar** Associate Professor, Dept. of MBA, SMVEC	Internal Member
14	**Ms. K. Gajalakshmi** Assistant Professor, Dept. of English, SMVEC	Internal Member

Agenda of the Meeting

1. Review of Fourth BoS
2. Approval of profession electives for semester V, VI and VII Semester
3. Approval of Core syllabi for semester VII
4. Any other suggestions from the BoS Members

Minutes of the Meeting

Dr. J. Madhusudanan, Chairman, BoS opened the meeting by welcoming and introducing the external members, to the internal and co-opted members and thanked them for accepting to become the member of the Board of Studies and the meeting thereafter deliberated on agenda items that had been approved by the Chairman.

BOS/2022/AIDS/UG/5.1	Discussed and approved the Fourth BoS
BOS/2022/AIDS/UG/5.2	Professional Elective Syllabi from V to VI and VII semesters for the B.Tech – Artificial Intelligence and Data Science have been approved with the following suggestions.

B.Tech. – Artificial Intelligence and Data Science

2. A. 10. 3

SI.No	Regulation	Semester	Subject Name with Code	Unit	Particulars
1	R-2020	V	Golang Programming U20ADE509	V	Suggested to include specific use cases instead of implementation of research papers (Annexure-1)
2	R-2020	VI	Advanced Java Programming U20ADE611	ALL	The expert members are satisfied with the contents included in the syllabus
3	R-2020	VII	Industry 4.0 U20ADE716	-	Suggested to remove the subject and include any other professional paper as elective and get approval in the next Bos meeting (Annexure-1)
4	R-2020	VII	AI Ethics (U20ADE717)	II,IV	Suggested to AI and Explainable AI in any of the unit
5	R-2020	VII	Image And Video Analytics U20ADE718	Unit V	Suggested to include add topics like DCT in Second unit, Feature Engineering in fourth unit. They also noticed and suggested that the thresholding topic is being repeated in second as well as fourth unit and it can be

3

B.Tech. – Artificial Intelligence and Data Science

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SI.No	Regulation	Semester	Subject Name with Code	Unit	Particulars
					rectified. (Annexure1)
6	R-2020	VII	Social Network Analysis U20ADE719	All Units	The expert members are satisfied with the contents included in the syllabus
7	R-2020	VII	Time Series Analysis and Forecasting U20ADE720	-	The expert members are satisfied with the contents included in the syllabus

BOS/2022/AIDS/UG/5.3 Discussed about the core paper of semester VIII and got approval with the following suggestions

SI.No	Regulation	Semester	Subject Name with Code	Unit	Particulars
1	R-2020	VIII	Block Chain and Cryptography U20ADT817	ALL UNITS	Suggested to frame Syllabus for this subject as follows: Include classical and modern cryptography as first two units and blockchain concepts for remaining three units

BOS/2022/AIDS/UG/5.4 Discussed and approved the Certification Course for the III, IV, V and VI semester under Regulation 2020 for the B.Tech students admitted in the Academic Year 2020-21 (second and third year)

B.Tech. – Artificial Intelligence and Data Science

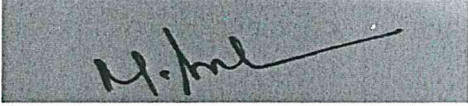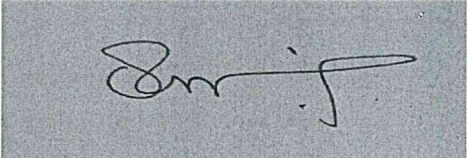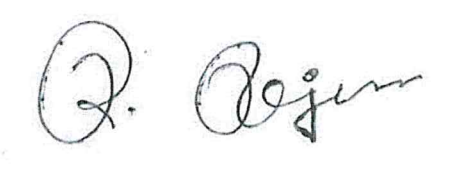| BOS/2022/AIDS/UG/5.5	Got suggestions from the BoS Members to make the following changes CAM & ESM marks have been awarded as 50 and 50 instead of 100 Marks(CAM) in "General Proficiency I" Laboratory from Semester III. CAM & ESM marks have been awarded as 50 and 50 instead of 100 Marks(CAM) in "General Proficiency II" Laboratory from Semester IV CAM & ESM marks have been awarded as 50 and 50 instead of 100 Marks(CAM) in "Comprehensive Viva-voce " Laboratory from Semester VII. CAM & ESM marks have been awarded as 50 and 50 instead of 100 Marks(CAM) in "Project Phase -I " from Semester VIII.
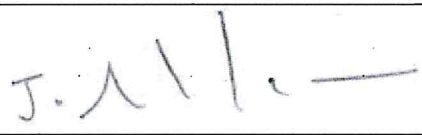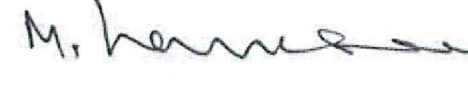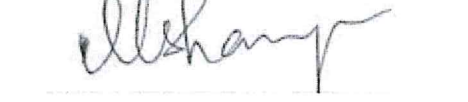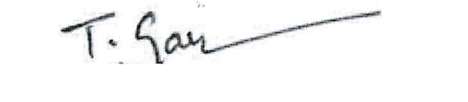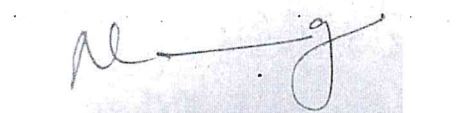
The meeting was concluded at 3.45 PM with vote of thanks by **Dr. J. Madhusudanan**, Head of Department, Artificial Intelligence and Data Science.

Sl.No	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	**Dr. J. Madhusudanan,** Professor and Head, Department of AI&DS, SMVEC.	Chairman	
2	**Dr. M. Thangaraj,** Professor & Head, Madurai Kamaraj University, Madurai.	Subject Expert	
3	**Dr. Chandra Mouli P.V.S.S.R,** Associate Professor & Head Central University of Tamil Nadu, Tiruvarur, Tamil Nadu.	Subject Expert	
4	**Dr. C. Muthu,** Professor & Head, Loyola College, Chennai.	Subject Expert	
5	**Dr. Mohanraj Vengadachalam,** Machine Learning Lead, Standard Chartered GBS, Chennai.	Industrial Expert	
6	**Dr. J. Uthayakumar,** Research Head, Genesys Academy, Puducherry.	Member	

7	**Dr. M. Auxilia** Associate Professor, Department of AI&DS, SMVEC	Internal Member	
8	**Mr. K. Pragash** Assistant Professor, Department of AI&DS, SMVEC	Internal Member	
9	**Mr.R.Rajan** Assistant Professor, Department of AI&DS, SMVEC	Internal Member	
10	**Prof. M. Ganesan** Assistant Professor, Department of CSE, SMVEC	Internal Member	
11	**Prof. M. Shanmugam** Assistant Professor, Department of CSE, SMVEC	Internal Member	
12	**Dr. T. Gayathri** Professor, Department of Maths, SMVEC	Internal Member	
13	**Dr. R. Sivakumar** Associate Professor, Dept. of MBA, SMVEC	Internal Member	
14	**Ms. Gajalakshmi** Assistant Professor, Dept. of English, SMVEC	Internal Member	

B.Tech. – Artificial Intelligence and Data Science

Annexure – I

(Revised V and VI Semester Professional Elective Curriculum

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Core Papers of VII Semester)

SEMESTER – V		
Sl. No.	Course Code	Course Title
Professional Elective – II (Offered in Semester V)		
1	U20ADE506	Business Intelligence
2	U20ADE507	Java Programming
3	U20ADE508	R Programming
4	U20ADE509	GoLang Programming
5	U20ADE510	User Interface and User Experience (UI/UX)
Professional Elective – II (Offered in Semester VI)		
1	U20ADE611	Advanced Java Programming
2	U20ADE612	Automation Testing Using Selenium
3	U20ADE613	Cloud Computing
4	U20ADE614	Web Analytics
5	U20ADE615	Mobile Application Development
Professional Elective – IV (Offered in Semester VII) *		
1	U20ADE716	New Paper
2	U20ADE717	AI Ethics
3	U20ADE718	Image and Video Analytics
4	U20ADE719	Social Network Analysis
5	U20ADE720	Time Series Analysis and Forecasting

B.Tech. – Artificial Intelligence and Data Science

SEMESTER – VII		
SI. No.	Course Code	Course Title
Theory		
1	U20ADT817	Block chain and Cryptography

SEMESTER – III										
SI. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U20BST337	Probability and Statistics for Data Science	BS	2	2	0	3	25	75	100
2	U20EST363	Software Engineering and Agile software Development	ES	3	0	0	3	25	75	100
3	U20EST364	Operating system Internals	ES	3	0	0	3	25	75	100
4	U20EST365	Algorithm Design and Analysis	ES	3	0	0	3	25	75	100
5	U20ADT303	Fundamentals of Artificial Intelligence	PC	3	0	0	3	25	75	100
6	U20ADT304	Basic Machine Learning Techniques	PC	2	2	0	3	25	75	100
Practical										
7	U20HSP301	General Proficiency – I	HS	0	0	2	1	50	50	100
8	U20BSP326	Statistical Laboratory	BS	0	0	2	1	50	50	100
9	U20ESP366	Algorithm Design and Analysis Laboratory	ES	0	0	2	1	50	50	100
10	U20ADP303	Artificial Intelligence Laboratory	PC	0	0	2	1	50	50	100
11	U20ADP304	Basic Machine Learning Techniques Laboratory	PC	0	0	2	1	50	50	100
Employability Enhancement Course										
12	U20ADC3XX	Certification Course-III	EEC	0	0	4	-	100	-	100
13	U20ADS302	SDC 2*	EEC	0	0	2	-	100	-	100

B.Tech. – Artificial Intelligence and Data Science

2. A.10.9

	Mandatory Course									
14	U20ADM303	Physical Education	MC	0	0	2	-	100	-	100
							23	750	650	1400

				SEMESTER – IV						

Sl. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U20BST432	Discrete Mathematics and Graph Theory	BS	2	2	0	3	25	75	100
2	U20ADT405	Data Visualization	PC	3	0	0	3	25	75	100
3	U20ADT406	Advanced Machine Learning Techniques	PC	2	2	0	3	25	75	100
4	U20ADT407	Expert system and Decision Making	PC	3	0	0	3	25	75	100
5	U20ADE4XX	Professional Elective – I	PE	3	0	0	3	25	75	100
6	U20XXO4XX	Open Elective – I	OE	3	0	0	3	25	75	100
Practical										
7	U20HSP402	General Proficiency – II	HS	0	0	2	1	50	50	100
8	U20ADP405	Data Visualization Laboratory	PC	0	0	2	1	50	50	100
9	U20ADP406	Advanced Machine Learning Techniques Laboratory	PC	0	0	2	1	50	50	100
10	U20ADP407	Expert system and Decision-Making Laboratory	PC	0	0	2	1	50	50	100
Employability Enhancement Course										
11	U20ADC4XX	Certification Course-IV	EEC	0	0	4	-	100	-	100
12	U20ADS403	SDC 3*	EEC	0	0	2	-	100	-	100

B.Tech. – Artificial Intelligence and Data Science

2. A. 10.10

Sl. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	U20ADT715	Robotic and Automation	PC	3	0	0	3	25	75	100
2	U20ADT716	IoT Systems and Analytics	PC	3	0	0	3	25	75	100
3	U20ADE7XX	Professional Elective – IV	PE	3	0	0	3	25	75	100
4	U20XXO7XX	Open Elective – IV	OE	3	0	0	3	25	75	100
Practical										
5	U20HSP703	Business Basics for Entrepreneur	HS	0	0	2	1	100	-	100
6	U20ADP714	IoT Systems and Analytics Laboratory	PC	0	0	2	1	50	50	100
7	U20ADP715	Robotic and Automation Laboratory	PC	0	0	2	1	50	50	100
8	U20ADP716	Comprehensive Viva -Voce	PC	0	0	2	1	50	50	100
Project Work										
9	U20ADW701	Project Phase – I	PW	0	0	4	2	50	50	100
10	U20ADW702	Internship / Inplant Training	PW	0	0	0	2	100	-	100
Mandatory Course										
11	U20ADM707	Professional Ethics	MC	2	0	0	-	100	-	100
							20	700	400	1100

B.Tech. – Artificial Intelligence and Data Science

2. A.10.11

	L	T	P	C	Hrs
U20ADE509 **GOLANG PROGRAMMING**	3	0	0	3	45

Course Objectives
- To learn about GO Basics.
- To understand the concept of GO libraries for the development.
- To learn various concepts of Machine learning and security libraries .
- To understand and implementation of Understand the web development using GO.
- To understand various concept Research paper.

Course Outcomes
After completion of the course, the students will be able to
CO1 - Understand GO Basics.
CO2 - Understand various GO libraries for the development.
CO3 - Understand the Machine learning and security libraries.
CO4 - Understand the Understand the web development using GO.
CO5 - Implement Research paper(s).

UNIT 1 BASICS AND DATA STRUCTURES   **9Hrs.**
Introduction to Go – variables – constants – strings – pointers – arrays – slices – maps – structs – interfaces - Concurrency.

UNIT 2 FUNCTIONS, EXCEPTIONS AND FILE HANDLING   **9Hrs.**
Function as parameter - function as return type - variable scope - pointers – pass by value - pass pointers - pointers to pointers. Error handling – defer - panic – recover - customer error. File handling – file reading and writing. Handling error while read/ write file handling of YAML, JSON, XML, CSV.

UNIT 3 NETWORK, SECURITY AND LIBRARIES   **9Hrs.**
Libraries- Builtin – math - mathgl - golearn - gorgonia – goml – evo – eaopt - gomind, - and go standard libraries. Socket level programming - public key encryptions - GO RPC – hashing - packet capturing and injection - Forensics.

UNIT 4 WEB DEVELOPMENT   **9Hrs.**
HTTP Client/ Server. GORM – What is GORM - using GORM - doing CRUD operations. Rest architecture - Gorm patterns. SQL-JWT-Integrating with JWT.

UNIT 5 IMPLEMENTATION.   **9Hrs.**
Implementation of case study from research paper(s).

TEXT BOOKS

1. Alan A.A. Donovan and Brian W.Kernighan, "The Go Programming Language", Addison-Wesley; 1st edition (5 November 2015).
2. Caleb Doxsey, "Introduction Go", CreateSpace Independent Publishing Platform (3 September 2012).
3. Adam Woodbeck , "Network Programming with Go", No Starch Press (25 March 2021).
4. Shijin Varghese, "Web development with Go", Springer Nature; 1st ed. edition (1 February 2016).
5. Go Design Patterns, "Mario Castro Contreras", Packt Publishing Limited (24 February 2017).

B.Tech. – Artificial Intelligence and Data Science

REFERENCE BOOKS

1. Jay Megavren, 'Headfirst Go', O'Reilly (3 May 2019).
2. Data Structures and Algorithms with Golang: Level Up Your Go Programming Skills to Develop Faster and More Efficient Code by Bhagvan Kommadi, Packt Publishing Limited (30 March 2019).
3. Network Programming with Go: Essential Skills for Using and Securing Networks, Jan Newmarch, Apress, 1st edition (18 May 2017).
4. Mastering Go: Create Golang Production Applications Using Network Libraries, Concurrency, and Advanced Go Data Structures by Mihalis Tsoukalos, Packt Publishing, 2nd edition (29 August 2019).
5. Security with Go: Explore the Power of Golang to Secure Host, Web, and Cloud Services by John Daniel Leon, Packt Publishing, 1st edition (31 January 2018).

WEB REFERENCES:

1. https://pkg.go.dev/std
2. https://go.dev/
3. https://golangdocs.com/golang-machine-learning-libraries

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	-	-	-	-	-	-	-	1	1	1	2	1	-
2	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
3	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
4	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
5	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-

B.Tech. – Artificial Intelligence and Data Science

U20ADE611	ADVANCED JAVA PROGRAMMING	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

The course will introduce the students to
- To understand Sequence Datatypes in Java
- To understand Data Structures in Java
- To understand Spring framework in Java
- To understand Spring Databases
- To understand Microservices in Java

Course Outcomes

After completion of the course, the students will be able to

CO1 – Understand Sequence Datatypes in Java
CO2 – Understand Data Structures in Java
CO3 – Understand Spring framework in Java
CO4 – Understand Spring Databases
CO5 – Understand Microservices in Java

UNIT I JAVA.UTIL (9 Hrs)

Introduction to java.util – Arraylist – List – Hashmap – Sets

UNIT II JAVA COLLECTION FRAMEWORK (9 Hrs)

Data Augmentation using java.collection – linked list – queue – stack – graph – tree

UNIT III SPRING FRAMEWORK (9 Hrs)

Introduction to spring – bean – dependency injection – inversion of control – bean factory – application context – concepts of auto configuration –. properties –. yaml

UNIT IV SPRING DATABASES (9 Hrs)

Spring databases spring data – spring data JPA – spring data – mongoDB – spring data JDBC

UNIT V MICROSERVICES IN JAVA (9 Hrs)

Microservices: spring cloud gateway – spring cloud circuit breakers – OpenFeign – spring cloud sleuth – Microservices Patterns: aggregators – SAGA-CQRS-event sourcing – Rest API – HTTP method: post-get-put-delete-options-trace – HTTP status codes

Text Books

1. Craig Walls, "Spring boot in action", Manning, 2015
2. Uttam K. Roy, "Advanced Java Programming", Oxford University Press, 2015
3. Claudio Eduardo de Oliveira, Greg L. Turnquist, Alex Antonov, "Developing Java Applications with Spring and Spring Boot", Packt Publishing, 2018
4. Craig Walls, "Spring in Action", Manning, 2018
5. B. Prasanalakshmi , "Advanced Java Programming", CBS Publishers & Distributors, 2015

Reference Books

1. Cay. S Horstmann and Gary Cornell, "Core Java : Volume II - Advanced Features", Pearson, 2008
2. Rod Johnson, Juergen Hoeller, Alef Arendsen, Thomas R, "Professional Java Development With The Spring Framework", Wiley India Pvt. Limited, 2009
3. Dr.Rajendra Kawale, "Advanced Java", Devraj Publications, Mumbai, 2018
4. Holzner, Steven et.al, "Java 2 Programming Black Book",DreamTech Press, New Delhi, 2009
5. Herbert Schildt, Complete Reference Java", Mcgraw Hill Education, New Delhi, 7th Edition, 2021

B.Tech. – Artificial Intelligence and Data Science

WEB REFERENCES
1. www.javatpoint.com/
2. www.tutorialspoint.com/java
3. www.nptel.ac.in/courses/106105084/30

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	-	-	-	-	-	-	-	1	1	1	2	1	-
2	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
3	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
4	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
5	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-

B.Tech. – Artificial Intelligence and Data Science

U20ADE717	AI ETHICS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives
The course will introduce the students to
- To understand the ethics of AI
- To understand the difference between Human and Machine
- To understand the privacy issues when using AI
- To understand bias in AI decision
- To impart concern for society and its effects from AI

Course Outcomes
After completion of the course, the students will be able to
CO1 – Understand the ethics of AI
CO2 – Understand the difference between Human and Machine
CO3 – Understand the privacy issues when using AI
CO4 – Understand bias in AI decision
CO5 – Effects of AI in environment and society

UNIT I INTRODUCTION (9 Hrs)
The AI Hype and Fears – The Real and Pervasive Impact of AI – Ethical and Societal Problems – Superintelligence and Transhumanism – Frankenstein's New Monster – Transcendence and the AI Apocalypse

UNIT II AI AND HUMANS (9 Hrs)
Fundamental Differences between Humans and Machines – Modernity, Posthumanism, and Postphenomenology – Questioning the Moral Status of AI – Moral Agency – Moral Patiency – Toward More Practical Ethical Issues

UNIT III PRIVACY AND THE OTHER USUAL SUSPECTS (9 Hrs)
Privacy and Data Protection – Manipulation, Exploitation, and Vulnerable Users – Negative use of AI – Safety and Security – Moral Responsibility – Transparency and Explainability

UNIT IV BIAS AND CHALLENGES OF POLICYMAKERS (9 Hrs)
Bias – The Future of Work and Life – Questions Policymakers Have to Answer and should do – Ethical Principles and Justifications – Technological Solutions and the Question of Methods and Operationalization – Proactive Ethics – Practice Oriented and Bottom Up – Toward a Positive Ethics – Interdisciplinarity and Transdisciplinarity – The Risk of an AI Winter and the Danger of the Mindless Use of AI

UNIT V AI AND ENVIRONMENT (9 Hrs)
Should AI Ethics Be Human-Centric? – Getting Our Priorities Right – AI, Climate Change, and the Anthropocene – The New Space Craze and the Platonic Temptation – Toward Sustainable AI – Wanted: Intelligence and Wisdom

Text Books

1. Mark Coeckelbergh, "AI Ethics", MIT Press, 2020
2. S. Matthew Liao, "Ethics of Artificial Intelligence", Oxford University Press, 2020
3. Frank Pasquale, Markus Dirk Dubber, Sunit Das, "The Oxford Handbook of Ethics of AI", Oxford University Press, 2020.
4. Bernd Carsten Stahl, "Artificial Intelligence for a Better Future", Springer International Publishing, 2021.
5. Luciano Floridi, "Ethics, Governance, and Policies in Artificial Intelligence", Springer International Publishing, 2021.

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Reference Books

1. Paula Boddington, "Towards a Code of Ethics for Artificial Intelligence" , Springer International Publishing, 2017.
2. Abhivardhan, "Artificial Intelligence Ethics and International Law", BPB Publications, 2019
3. Saswat Sarangi, Pankaj Sharma, "Artificial Intelligence: Evolution, Ethics and Public Policy", Taylor & Francis, 2018
4. Keith Frankish, William M. Ramsey, "The Cambridge Handbook of Artificial Intelligence", Cambridge University Press, 2014
5. Ingrid Vasiliu-Feltes, Jane Thomason, "Applied Ethics in a Digital World", IGI Global, 2021

WEB REFERENCES

1. https://www.techtarget.com/whatis/definition/AI-code-of-ethics
2. https://www.onespan.com/blog/trustworthy-ai-why-we-need-it-and-how-achieve-it
3. www. tutorialspoint.com

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	-	-	-	-	-	-	-	1	1	1	2	1	-
2	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
3	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
4	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
5	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-

B.Tech. – Artificial Intelligence and Data Science

U20ADE718	IMAGE AND VIDEO ANALYTICS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives
- To learn about Digital image and video processing.
- To understand the concept of Image and Video enhancement and restoration.
- To learn various concepts of Image analysis.
- To understand and implementation of Video analysis.
- To understand various concept Feature Detection And Description.
- To understand the concept of Object detection and recognition.

Course Outcomes
After completion of the course, the students will be able to
CO1 - Learn about Digital image and video processing.
CO2 - Concept of Image and Video enhancement and restoration.
CO3 - Various concepts of Image analysis.
CO4 - Implementation of Video analysis.
CO5 - Various concept Feature Detection And Description.
CO6 – Concept of Object detection and recognition.

UNIT 1 INTRODUCTION TO DIGITAL IMAGE AND VIDEO PROCESSING   9Hrs.
Digital image representation - Sampling and Quantization - Types of Images - Basic Relations between Pixels – Neighbors – Connectivity - Distance Measures between pixel - Linear and Non Linear Operations - Introduction to Digital Video - Sampled Video - Video Transmission. **Gray-Level Processing:** Image Histogram - Linear and Non-linear point operations on Images - Arithmetic Operations between Images - Geometric Image Operations.**Binary Image Processing:** Image Thresholding - Region labeling - Binary Image Morphology.

UNIT 2 IMAGE AND VIDEO ENHANCEMENT AND RESTORATION   9Hrs.
Spatial domain - Linear and Non-linear Filtering - Morphological filtering - Frequency domain– Homomorphic Filtering - Blotch Detection and Removal - Blotch Detection - Motion Vector Repair and Interpolating Corrupted Intensities - Intensity Flicker Correction – Flicker Parameter Estimation - Brief introduction towards Wavelets - Wavelet based image denoising - Basic methods for image restoration using deconvolution filters.

UNIT 3 IMAGE AND VIDEO ANALYSIS   9Hrs.
Image Compression: Huffman coding - Run length coding - LZW coding - Lossless Coding - Wavelets based image compression. **Video Compression:** Basic Concepts and Techniques of Video Coding and the H.264 Standard - MPEG-1 and MPEG-2 Video Standards.

UNIT 4 FEATURE DETECTION AND DESCRIPTION.   9Hrs
Introduction to feature detectors - descriptors - matching and tracking - Basic edge detectors– canny – sobel - prewitt etc. - Image Segmentation - Region Based Segmentation – Region Growing and Region Splitting and Merging - Thresholding– Basic global thresholding - optimum global thresholding using Otsu's Method.

UNIT 5 OBJECT DETECTION AND RECOGNITION.   9Hrs
Object detection and recognition in image and video - basic texture descriptors - GLCM - LBP and its applications in image and video analysis - object tracking in videos.

TEXT BOOKS
1. Alan Bovik, "Handbook of Image and Video Processing" , Second Edition, Academic Press, 2005.
2. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2008.
3. Richard Szeliski, "Computer Vision – Algorithms and Applications ", Springer, 2011.
4. Ali Ismail Awad and Mahmoud Hassaballah, "Image Feature Detectors and Descriptors", Foundations and Applications, Springer; 1st ed. 2016 edition (2 March 2016).
5. Xiaoyue Jiang and Abdenour Hadid, "Deep Learning in Object Detection and Recognition Hardcover", Springer; 1st ed. 2019 edition (27 November 2019).

B.Tech. – Artificial Intelligence and Data Science

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1. Anil K Jain, "Fundamentals of Digital Image Processing ", PHI, 2011.
2. Oge Marques, "Practical Image and Video Processing Using MatLab ", Wiley, 2011.
3. John W. Woods, " Multidimensional Signal, Image, Video Processing and Coding ", Academic Press, 2006.
4. Mohammed Salemdeeb, "Object Detection and Recognition Using Deep Learning", Scholars' Press (30 December 2020).
5. Davut Armagan Kaya, "Feature Detection and Matching", Grin Verlag (17 January 2021).

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1. https://www.geeksforgeeks.org/digital-image-processing-basics/
2. https://www.javatpoint.com/digital-image-processing-tutorial
3. https://www.tutorialspoint.com/dip/index.htm

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	-	-	-	-	-	-	-	1	1	1	2	1	-
2	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
3	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
4	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
5	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-

B.Tech. – Artificial Intelligence and Data Science

U20ADE719	SOCIAL NETWORK ANALYSIS	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives
- To learn about Social Networks.
- To understand the concept of Community Detection Algorithms for Community Detection.
- To learn various concepts of Link Prediction.
- To understand and implementation of Event Detection.
- To understand various concept and implementation of Social Influence Analysis.

Course Outcomes
After completion of the course, the students will be able to
CO1 - Understand the basics of Social Network Models and analysis.
CO2 - Analyse social network models for community detection.
CO3 - Implement link prediction and event detection.
CO4 - Analyse social influence and contributing factors.
CO5 - Various concept and implementation of Social influence Analysis.

UNIT 1 SOCIAL NETWORKS 9Hrs.
An Introduction - **Types of Networks**: General Random Networks - Small World Networks - Scale - Free Networks - Examples of Information Networks - Network Centrality Measures - Strong and Weak ties - Homophily **Walks**: Random walk-based proximity measures - Other graph-based proximity measures - Clustering with random-walk based measures.

UNIT 2 COMMUNITY DETECTION ALGORITHMS FOR COMMUNITY DETECTION 9Hrs.
The Kernighan-Lin algorithm - Agglomerative/Divisive algorithms - Spectral Algorithms - Multi-level Graph partitioning - Markov Clustering - Community Discovery in Directed Networks - Community Discovery in Dynamic Networks- Community Discovery in Heterogeneous Networks - Evolution of Community.

UNIT 3 LINK PREDICTION 9Hrs.
Feature based Link Prediction - Bayesian Probabilistic Models - Probabilistic Relational Models - Linear Algebraic Methods: Network Evolution based Probabilistic Model - Hierarchical Probabilistic Model – Relational Bayesian Network. Relational Markov Network.

UNIT 4 EVENT DETECTION. 9Hrs.
Supply Chain and Identity on Blockchain - Blockchain interaction with existing infrastructure – Trust in blockchain data - Scaling Blockchain – reading and writing data. Differentiate nodes - sparse data and Merkle trees - Fixing on the fly – Layer 2 solutions - Lightning and Ethereum state channels.

UNIT 5 SOCIAL INFLUENCE ANALYSIS. 9Hrs.
Influence measures - Social Similarity - Measuring Influence - Influencing actions and interactions - Influence maximization.

TEXT BOOKS
1. David Easley, Jon Kleinberg: Networks, Crowds and Markets: Reasoning about a highly connected world, Cambridge Univ Press 2010
2. S.Wasserman, K.Faust: Social Network Analysis: Methods and Applications, Cambridge Univ Press, 1994
3. Tanmoy Chakraborty, "Social Network Analysis" Wiley (1 October 2021); Wiley India Pvt Ltd.
4. Tansel Ozyer, "Social Media Analysis for Event Detection", Springer; 1st ed. 2022 edition (October 28, 2022)
5. Stanley Wasserman, "Social Network Analysis Methods and Applications", Cambridge University Press, June 2012

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1. A. Dhotre, "Social Network Analysis", Technical publications.
2. Rokia Missaoui, "Social Network Analysis – Community Detection and Evolution", Springer; 2014th edition (26 January 2015).
3. Srinivas virinchi, "Link Prediction in Social Networks: Role of Power Law Distribution (SpringerBriefs in Computer Science)", Springer; 1st ed. 2016 edition (29 January 2016).
4. David Knoke and Song Yang's, "Social Network Analysis", SAGE publications, third edition, November 2007.
5. Mehmet kaya, "Influence and Behavior Analysis in Social Networks and Social Media", Springer (January 18, 2019).

WEB REFERENCES:

1. https://towardsdatascience.com/social-network-analysis-from-theory-to-applications-with-python-d12e9a34c2c7
2. https://www.geeksforgeeks.org/types-of-social-networks-analysis/
3. https://www.oreilly.com/library/view/social-network-analysis/9781449311377/ch01.html

B.Tech. – Artificial Intelligence and Data Science

				L	T	P	C	Hrs
U20ADE720		**TIME SERIES ANALYSIS AND FORECASTING**		3	0	0	3	45

Course Objectives

- To learn about Forecasting and its Methods.
- To understand the concept of Multiple Linear Regressions.
- To learn various concepts of Time Series Regression.
- To understand the concept of Non-seasonal Box-Jenkins Modelling and Their Tentative Identification.
- To understand about Box-Jenkins Seasonal Modelling.

Course Outcomes

After completion of the course, the students will be able to

CO1 -.About Forecasting and its Methods.
CO2 -.Concept of Multiple Linear Regressions.
CO3 -.Various concepts of Time Series Regression.
CO4 -.Non-seasonal Box-Jenkins Modelling and Their Tentative Identification.
CO5 -.Box-Jenkins Seasonal Modelling.

UNIT 1 AN INTRODUCTION TO FORECASTING. (9Hrs).

Forecasting and Data - Forecasting Methods - Errors in Forecasting - Choosing a Forecasting Technique. -An Overview of Quantitative Forecasting Techniques. **REGRESSION ANALYSIS**: The Simple Linear Regression Model - The Least Squares Point Estimates – Point Estimates and Point Predictions - Model Assumptions and the Standard Error - Testing the Significance of the Slope andy Intercept - Confidence and Prediction Intervals - Simple Coefficients of Determination and Correlation - An F Test for the Model.

UNIT 2 MULTIPLE REGRESSIONS. (9Hrs)

The Linear Regression Model - The Least Squares Estimates, and Point Estimation and Prediction - The Mean Square Error and the Standard Error - Model Utility: R2 - Adjusted R2 - and the Overall F Test. **Model Building and Residual Analysis**: Model Building and the Effects of Multicollinearity - Residual Analysis in Simple Regression – Residual Analysis in Multiple Regression - Diagnostics for Detecting Outlying and Influential Observations.

UNIT 3 TIME SERIES REGRESSIONS. (9Hrs)

Modelling Trend by Using Polynomial Functions - Detecting Autocorrelation - Types of Seasonal Variation - Modelling Seasonal Variation by Using Dummy Variables and Trigonometric Functions - Growth Curves - Handling First-Order Autocorrelation. **Decomposition Methods:** Multiplicative Decomposition - Additive Decomposition - The X-12-ARIMA Seasonal Adjustment Method - Exercises. **Exponential Smoothing:** Simple Exponential Smoothing - Tracking Signals - Holt's Trend Corrected Exponential Smoothing - Holt-Winters Methods - Damped Trends and Other Exponential.

UNIT 4 NON-SEASONAL BOX-JENKINS MODELLING AND THEIR TENTATIVE IDENTIFICATION. (9Hrs)

Stationary and Nonstationary Time Series - The Sample Autocorrelation and Partial Autocorrelation Functions: The SAC and SPAC - An Introduction to Non-seasonal Modelling and Forecasting - Tentative Identification of Non - seasonal Box-Jenkins Models. **Estimation, Diagnostic Checking, and Forecasting for Non-seasonal Box-Jenkins Models**: Estimation – Diagnostic Checking – Forecasting - A Case Study - Box-Jenkins Implementation of Exponential Smoothing.

UNIT 5 BOX-JENKINS SEASONAL MODELLING. (9Hrs)

Transforming a Seasonal Time Series into a Stationary Time Series - Examples of Seasonal Modelling and Forecasting - Box-Jenkins Error Term Models in Time Series Regression. **Advanced Box-Jenkins Modelling:** The General Seasonal Model and Guidelines for Tentative Identification - Intervention Models - A Procedure for Building a Transfer Function Model. **Causality in time series:** Granger causality - Hypothesis testing on rational expectations - Hypothesis testing on market efficiency.

B.Tech. – Artificial Intelligence and Data Science

TEXT BOOKS

1 Douglas C. Montgomery, Cheryl L. Jennings, Murat Kulahci, "Introduction to Time Series Analysis and Forecasting (Wiley Series in Probability and Statistics)", Wiley,2008.

2. Wayne A. Woodward, Bivin Philip Sadler, Stephen Robertson, "Time Series for Data Science: Analysis and Forecasting", CRC Press,2022.

3. George Box, Gwilym M. Jenkins, Gregory Reinsel, "Time series analysis: Forecasting and control". Prentice Hall, 1994.

4. Bruce L. Bowerman, Richard O'Connell, Anne Koehler, "Forecasting, Time Series, and Regression, 4th Edition", Cengage Unlimited

5. Enders W. Applied Econometric Time Series. John Wiley & Sons, Inc., 1995

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1. Cryer, Jonathan D.; Chan, Kung-sik, "Time series analysis: with applications in R", ed.: New York: Springer, cop. 2008

2. Tarek A. Atwan, "Time Series Analysis with Python Cookbook: Practical recipes for exploratory data analysis, data preparation, forecasting, and model evaluation", Packt Publishing, 2022.

3. Søren Bisgaard, Murat Kulahci, "Time Series Analysis and Forecasting by Example", Wiley, 2011.

4. Cryer, Jonathan D.; Chan, Kung-sik, "Time series analysis: with applications in R", ed, New York: Springer, cop. 2008.

5. Mills, Terence C, "Applied time series analysis: a practical guide to modeling and forecasting" Elsevier,Academic Press,2019.

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1.https://www.espon.eu/sites/default/files/attachments/TR_Time_Series_june2012.pdf

2.https://www.tutorialspoint.com/time_series/time_series_tutorial.pdf

3.https://www.mathematik.uni-wuerzburg.de/fileadmin/10040800/user_upload/time_series/the_book/2012-August-01-times.pdf

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
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4	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
5	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-

B.Tech. – Artificial Intelligence and Data Science

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	L	T	P	C	Hrs
U20ADT817 **BLOCK CHAIN AND CRYPTOGRAPHY**	3	0	0	3	45

Course Objectives
- To learn about Block Chain concept.
- To understand the concept of Smart Contracts.
- To learn various concepts of Cryptography and Other Technologies.
- To understand and implementation of blockchain .
- To understand various concept and implementation of Bitcoin.

Course Outcomes
After completion of the course, the students will be able to
CO1 - Learn about Block Chain concept.
CO2 - Concept of Smart Contracts.
CO3 - Various concepts of Cryptography and Other Technologies.
CO4 - Implementation of blockchain.
CO5 - Various concept and implementation of Bitcoin.

UNIT 1 BLOCK CHAIN   **9Hrs.**
Introduction to crypto economics - Byzantine agreement - Extensions of BFT (Ripple, Stellar) - Blockchain Dynamics - Public and private blockchains - Hard and soft forks - Sharding Side chain - Verifiers – trust, cost and speed - Proof of work and other models.

UNIT 2 SMART CONTRACTS   **9Hrs.**
Distributed Virtual Machines, Smart Contracts, Oracles - Basics of contract law - Smartcontracts and their potential Trust in Algorithms, - Integration with existing legal systems - OpenZeplin, OpenLaw- Writing smart contracts.

UNIT 3 CRYPTOGRAPY AND OTHER TECHNOLOGIES.   **9Hrs.**
Application of Cryptography to Blockchain - Using hash functions to chain blocks - Digital Signatures to sign transactions - Using hash functions for Proof-of-Work. - Putting the technology together – examples of implementations with their tradeoffs.

UNIT 4 IMPLEMENTATION.   **9Hrs.**
Supply Chain and Identity on Blockchain - Blockchain interaction with existing infrastructure – Trust in blockchain data - Scaling Blockchain – reading and writing data. Differentiate nodes, sparse data and Merkle trees - Fixing on the fly – Layer 2 solutions - Lightning and Ethereum state channels

UNIT 5 BITCOIN.   **9Hrs.**
- The big picture of the industry – size, growth, structure, players - Bitcoin versus Cryptocurrencies versus Blockchain - Distributed Ledger Technology (DLT) - Strategic analysis of the space –Major players: Blockchain platforms, regulators, application providers, etc. - Bitcoin, HyperLedger, Ethereum, Litecoin, Zcash .

TEXT BOOKS
1. Don Tapscott, Alex Tapscott, "Blockchain Revolution", Portfolio, 2018.
2. Paul Vigna, Michael J. Casey, "The Age of Cryptocurrency", Picador,2016.
3. Alan T. Norman, "Blockchain Technology Explained", CreateSpace Independent Publishing Platform, 2017.
4. Bahga, Vijay Madisetti, "Block chain Applications: A Hands-On Approach", Arshdeep Bahga, Vijay Madisetti publishers 2017.
5. Roger Wattenhofer, The Science of the Blockchain, First Edition, CreateSpace 2017

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1. Mark Gates, "Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money", Wise Fox Publishing and Mark Gates 2017.
2. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer", 2018.
3. Joseph Bonneau and Arvind Narayanan, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, First Edition, Princeton University Press, 2016.
4. Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Crypto currencies", O'Reilly Media, Inc. 2014.
5. Melanie Swa, "Block chain", O'Reilly Media 2014.

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2. https://www.simplilearn.com/tutorials/blockchain-tutorial
3. https://www.edureka.co/blog/blockchain-tutorial/

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3	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
4	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-
5	3	2	1	1	-	-	-	-	-	1	1	1	2	1	-

B.Tech. – Artificial Intelligence and Data Science

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