

Manonmaniam Sundaranar University, Tirunelveli – 12.
Department of Computer Science & Engineering
University Department
M.Phil -Computer Science
(Effect from the Academic Year 2016-2017)

Eligibility

A candidate who has passed M.Sc. Computer Science of this University or an equivalent degree of other Universities accepted by the Syndicate as equivalent or M.C.A. of this University or any other University accepted by the Syndicate as equivalent with 55% or above marks. (Entrance Marks 50% + PG Degree 50% based on the Community Ranking)

Selection:

1. Selection for the M.Phil programme will be made based on sum of 25% of U.G. part III marks & 75% of the PG marks.
2. Admission will be based on Tamil Nadu Government Reservation Policy.

Course Structure

S.No.	Semester	Subject	Credits	Hours /week	Maximum Marks			Passing Minimum	
					Int.	Ext.	Tot	Ext	Tot
1	I	Core -I (Theory): Research Methodology	8	8	25	75	100	38	50
2	I	Core – I (Theory): Digital Image Processing	8	8	25	75	100	38	50
3	I	Elective Paper 1.Soft Computing 2.Pervasive and Mobile Computing 3.Advanced Computer Networks 4.Data Mining and Data Warehousing	8	8	25	75	100	38	50
4	II	Project and Viva-voce	16	-	25	75	100	38	50
Total			40	-	-	-	400	-	-

MSU/2016-17/ Univ.Depts/M.Phil (Computer Science)/Semester –I/Ppr.-1/Core-1
Research Methodology

Unit – I - Introduction- Motivation and objectives – Research methods vs Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical.

Unit-II – Research Formulation – Defining and formulating the research problem - Selecting the problem – Necessity of defining the problem – Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs- patents – web as a source – searching the web- Critical literature review – Identifying gap areas from literature review – Development of working hypothesis.

Unit-III – Research design and methods – Research design Basic Principles-Need of research design – Features of good design – important concepts relating to research design – Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models. Developing a research plan – Exploration, Description, Diagnosis, Experimentation. Determining experimental and sample designs.

Unit-IV – Data Collection and analysis- Execution of the research – Observation and Collection of data – Methods of data collection – Sampling Methods-Data Processing and Analysis strategies – Data Analysis with Statistical Packages – Hypothesis-testing – Generalization and Interpretation.

Unit-V – Reporting and thesis writing – Structure and components of scientific reports- Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, Structure and Language of typical reports – illustrations and tables – Bibliography, referencing and footnotes – Oral presentation – Planning – Preparation – Practice – Making presentation – Use of visual aids – Importance of effective communication-Research ethics – Ethical issues – Copy right - royalty – Intellectual property rights and patent law – Reproduction of published material – Plagiarism – Citation and acknowledgement.

REFERENCES

1. Kothari, C.R, 2014. *Research Methodology: Methods and Techniques*, New age International, 3rd Edition.
2. Kavadia Gerg, Agarwal & Agarwal, 2002, *Introduction to Research Methodology*, RBSA Publishers.
3. Agarwal, B.L., 2015, *Comprehensive Research Methodology*, New age International, 1st edition.
4. Mukul Gupta, Deepa Gupta, 2011, *Research Methodology*, PHI publisher,

Digital Image Processing

Unit I – INTRODUCTION

Image Processing – Fundamental steps in DIP – Components of Image processing system – Digital image fundamentals: Light and Electromagnetic spectrum – Image sensing and acquisition - Image sampling and quantization (Basic concepts- representing digital images- spatial and gray level resolution –zooming and shrinking digital images) - Basic relationship between pixels (Neighbors of a pixel-Adjacency,Connectivity,Regions and boundaries-Distance Measures).

Unit II - IMAGE ENHANCEMENT TECHNIQUES

Spatial Domain methods: Basic grey level transformation – Histogram processing (Histogram Equalization-Histogram matching-Local enhancement) – Enhancement using arithmetic and logic operations – Basics of spatial filtering: Smoothing and sharpening spatial filters

Frequency domain methods: Two dimensional DFT and its inverse - Smoothing and Sharpening filters(Ideal, Butterworth,Gaussian).

Unit III - IMAGE RESTORATION

Model of Image Degradation/restoration process – Noise models – Spatial filtering(Mean filters-Order statistics filters – Adaptive filters) – Periodic noise reduction by frequency domain filters(Band reject filters - bandpass filters – Notch filters) - Inverse filtering -Least mean square filtering – Constrained least mean square filtering.

Unit IV - IMAGE COMPRESSION

Fundamentals(Coding redundancy- interpixel redundancy-psychovisual redundancy-fidelity criteria)– Image compression models (Source encoder and decoder) – Error free compression (Variable length coding, LZW coding, bit plane coding) – Lossy compression (Transform coding, wavelet coding) – Image compression standards(Continuous tone still image,video compression standards).

Unit V - IMAGE SEGMENTATION

Image segmentation: Detection of discontinuities - Edge linking and boundary detection(local and global processing) – Thresholding(Basic global and adaptive) - Region Based segmentation(basic formulations-region growing-region splitting and merging) –

Object recognition: Structural methods (Matching shape numbers, string matching, Syntactic recognition of strings, Syntactic recognition of trees)

BOOKS

1. Rafael C Gonzalez, Richard E Woods, 3rd Edition, Digital Image Processing, Prentice Hall, 2008.
2. Image Processing Analysis and Machine Vision, Milan Sonka, Vaclav Hlavac, Vikas Publications, 2005.
3. B.Chanda and D.Dutta Majumder, Digital Image Processing and Applications, Prentice Hall of India, 2005
4. Geoff Doucherty, Digital Image Processing for Medical applications, Cambridge University press, 2015.

1. Soft Computing

UNIT I - FUZZY SET THEORY

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II - OPTIMIZATION

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton’s Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III - NEURAL NETWORKS

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Multilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV - NEURO FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V - APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Eastern Economy Edition 2007.

REFERENCES

1. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
2. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.

2. Pervasive and Mobile Computing

Unit I:

Evolution of wireless data and networks – Mobile computing – basic characteristics and functions – Different Networks – Middleware and gateways – Applications – Standard making bodies.

Unit II:

Emerging Technologies – Bluetooth – RFID – WiMax – Mobile IP – working of Mobile IP – IPv6. Brief overview of GSM – architecture – call routing in GSM. – Handover and roaming. GPRS architecture – GPRS network operations – GPRS Data services and Applications WAP – Architecture of WAP: layers and functions

Unit III:

Technologies: Introduction-Pervasive computing market- m-Business-Conclusions and Challenges. Applications: Airline Checking- Sales force Automation- Health Care- Tracking Systems. Device Technology: Hardware-Human-Machine Interface- Biometrics- Operating Systems-Programming Languages.

Unit Iv:

Device Connectivity: Protocols-Security-Device Management. Web Application Concepts: History of World Wide Web- Architecture- Protocols- Transcoding - Client Authentication. WAP: Introduction- Components of WAP Architecture- Infrastructure- Security Issues- Wireless Markup Language- WAP Push –WAP Products.

Unit V:

Voice Technology: Basics of Speech Recognition – Voice Standards- Speech Applications- Speech and Pervasive Computing- Security. Personal Digital Assistants : Device Categories-Characteristics-operating systems- software components-standards-applications and

Browsers. Server-Side Programming: Overview-Servelets- Enterprise Java Beans- JSP – Extensible Markup Languages-Web Services.

Access via WAP: WAP functionality-Implementation. Access from personal digital assistants: Example application – Synchronized Devices Implementation- Connected devices- Comparison. Voice Access: Example application- Implementation.

Books:

1. Mobile Computing – Technology, Applications and service creation” by Asoke k Talukder & Roopa R Yavagal – Third Edition, Tata McGrawHill publishers 2006
2. “Fundamentals of Mobile and Pervasive Computing” Frank Adelstein, Sandeep K.S. Gupta, Golden G. Richard III & Loren Schwiebert – Tata McGraw Hill, 2005.
3. Pervasive Computing Technology and Architecture of Mobile Internet Applications – jochen Burkhardt, Dr.Horst Henn and Stefan Hepper – Pearson Education Asia-2005.

3. Advanced Computer Networks

Unit I:

Data Communications – Networks – Internet – Protocols and standards, Network models – The Internet model. The physical Layer –Transmission media: Guided and Unguided Media.

Unit II:

Circuit switching – Time division and Space division switches and their combinations – Telephone network –High speed digital access: DSL, Cable Modems and SONET. Data Link Layer: Error Detection and Correction. Data Link Layer Protocols: Stop and wait ARQ, Go back N ARQ and Selective repeat ARQ, HDLC protocols.

Unit III:

LAN Medium Access Techniques: Multiple Access: ALOHA, CSMA and CSMA/CD technique, Controlled Access methods – Canalization. Ethernet LAN standard: Traditional Ethernet – Fast Ethernet and Gigabit Ethernet. Virtual Circuit Switching: Frame Relay Architecture – ATM: Design goals – Architecture of ATM – Layers and functions.

Unit IV

Network Layer functions: Internetworking – Packet switched internet, Addressing – Classes of addresses – sub netting and super netting. Routing – types – classful and classless addressing. Network Layer Protocols: ARP, IPv4, ICMP, IPv6 and ICMPv6.

Unit V:

Transport Layer Functions - Transport layer protocols: Process to Process delivery – User Datagram Protocol(UDP) – Transmission Control Protocol(TCP) : port numbers, services, segments, Connection establishment and termination, Flow and error Control. Congestion and Congestion Control, Quality of Service and Techniques to improve Quality of Control.

Text Book:

Data Communication & Networking written by Behrouz A. Forouzan, Third Edition, Tata McGraw Hill Edition 2004

Reference Books:

1. Computer Networks, Tananbaum, Fifth Edition –Pearson /PHI. 2004.
2. Data & Computer Communications, William Stalling PHI/ Pearson Edition Asia, Sixth Edition, 2004
3. Computer Networking – Janes F. Kurose, Kerth W. Ross Second Edition. 2003.

4. Data Mining and Data Warehousing

Unit – I

Operational Data Stores – Data Warehouses – ODS and DW Architecture – DW Implementation – Meta Data –Data Cube: Introduction - Implementation – Operations - Data Mining: Introduction – Process – Applications – Techniques

Unit – 2

Association Rules Mining – Introduction – The Apriori Algorithm – Apriori - TID algorithm – Direct Hashing and Pruning – Dynamic Itemset Counting - Mining Frequent Patterns without Candidate Generation – Classification: Introduction - Decision tree : The Induction Algorithm – Split Algorithms

Unit – 3

Classification: Naïve Bayes Method – Accuracy Measures – Other Evaluation Criteria Clustering – Introduction – Feature set – Types of Data - distance measures - Partitional methods - Hierarchical methods – Density based methods – dealing with large databases

Unit – 4

Web Mining: Web Terminology and Characteristics – Locality and Hierarchy – Web content Mining – Web structure Mining – Web usage Mining – Search Engines: Introduction – Functionality – Architecture – Ranking of Web Pages

Unit – 5

Spatial Mining – Introduction – spatial data overview – spatial data Mining primitives - Generalization and specialization – Spatial Rules – Spatial classification algorithm – spatial clustering Algorithms - Temporal Mining – Introduction - Modeling temporal events.

Text Books :

1. G. K. Gupta, “Introduction to Data Mining with Case studies”, PHI , 2011
2. Margaret H. Dunham, “Data Mining Introductory and Advanced Topics”, Pearson Education, 2003.
3. George M. Marakas, “Modern Data Warehousing, Mining and Visualization”, Pearson Education, 2003.
4. Alex Berson and Stephen J. Smith, “Data warehousing, Data Mining and OLAP”, McGraw Hill Book Company, 2001.

