



SARDAR PATEL UNIVERSITY, BALAGHAT

School of Engineering and Technology

Syllabus

Course: B.Tech

Semester: VIII

Branch: Computer Science and Engineering

w.e.f. Academic Session: 2024-25

CSE801 Soft Computing

Course Objectives:

1. To provide a foundational understanding of soft computing techniques and their applications.
2. To teach the principles and methods of fuzzy logic and its role in soft computing.
3. To introduce genetic algorithms as a method for optimization and problem-solving.
4. To analyze real-world applications of soft computing in various domains such as engineering, finance, and healthcare.

Unit I: Introduction to Soft Computing:

Introduction: Introduction to soft computing, application areas of soft computing, classification of soft computing techniques, structure & functioning of biological brain & Neuron, and concept of learning/training. Model of an Artificial Neuron, transfer/activation functions, perceptron, perceptron learning model, binary & continuous inputs, linear separability.

Unit II: Multilayer Neural Networks:

Multilayer Neural Networks: Feed Forward network - significance, training, loss function, Back-Propagation algorithm, applications. Feedback network -Hopfield Nets: architecture, energy functions, training algorithms & examples, competitive learning, self-organizing maps. Introduction to CNN and RNN network.

Unit III: Fuzzy Systems:

Fuzzy Systems: fuzzy set theory, fuzzy sets and operations, membership functions, concept of fuzzy relations and their composition, concept of fuzzy Measures. Fuzzy logic: fuzzy rules, inferencing. Fuzzy Control system: selection of membership functions, Fuzzy-fication, rule based design & inferencing, Defuzzyfication, applications of fuzzy system.

Unit IV: Genetic Algorithm:

Genetic algorithm: concepts, creation of off-spring, working principle, encoding, fitness functions, reproduction, genetic modeling. Generation cycle & convergence of GA, application areas of GA.

Unit V: Advanced Soft Computing Techniques:

Advanced soft computing techniques: Rough Set Theory - Introduction, Set approximation, Rough membership, Attributes, optimization. Introduction to Swarm Intelligence, Swarm Intelligence Techniques: Ant Colony Optimization, Particle Swarm Optimization, Bee Colony Optimization etc.

Reference Books:

1. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
2. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms,



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Synthesis & applications, PHI Publication

3. Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH Kosko: Neural Network & Fuzzy System, PHI Publication
4. Klir & Yuan ,Fuzzy sets & Fuzzy Logic: Theory & Appl.,PHI Pub. Hagen, Neural Network Design, Cengage Learning

Course Outcome:

At the end of the course, students should be able to:

1. Describe key concepts and techniques in soft computing.
2. Develop fuzzy logic systems to solve real-world problems.
3. Design and implement artificial neural networks for various applications.
4. Utilize genetic algorithms for optimization problems.
5. Analyze and discuss applications of soft computing in different fields.



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CSE802 Cloud Computing

Course Objectives:

1. To provide a foundational understanding of cloud computing models, architectures, and services.
2. To explore various cloud deployment models, including public, private, hybrid, and community clouds.
3. To introduce different types of cloud services, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).
4. To understand security challenges and best practices in cloud computing.

Unit I: Introduction:

Historical development, Vision of Cloud Computing, Characteristics of cloud computing as per NIST, Cloud computing reference model, Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments. Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis, Satellite Image Processing CRM and ERP, Social networking.

Unit II: Cloud Computing Architecture:

Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management. Cloud Offerings: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

Unit III: Cloud Management & Virtualization Technology:

Resiliency, Provisioning, Asset management, Concepts of Map reduce, Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute, storage, networking, desktop and application virtualization. Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements, Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits.

Unit IV: Cloud Security:

Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.

Unit V: Market Based Management of Clouds, Federated Clouds/Inter Cloud:

Characterization & Definition, Cloud Federation Stack, Third Party Cloud Services. Case study Google App Engine, Microsoft Azure, Hadoop, Amazon, Aneka



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List of Experiments:

1. Installation and configuration of Hadoop/Euceliptus etc.
2. Service deployment & Usage over cloud.
3. Management of cloud resources.
4. Using existing cloud characteristics & Service models.
5. Cloud Security Management. 6. Performance evaluation of services over cloud.

Reference Books:

1. Buyya, Selvi , “Mastering Cloud Computing”,TMH Pub
2. Shailendra Singh, “Cloud Computing” , OXFORD UNIVERSITY
3. Kumar Saurabh, “Cloud Computing”, Wiley Pub
4. Krutz , Vines, “Cloud Security “ , Wiley Pub
5. Velte, “Cloud Computing- A Practical Approach”, TMH Pub

Course Outcome:

At the end of the course, students should be able to:

1. Describe the key concepts and principles of cloud computing.
2. Identify and differentiate between various cloud deployment and service models.
3. Identify and propose solutions for security challenges in cloud computing.
4. Understand service management and monitoring techniques in cloud environments.



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Elective-V CSE8031 Data Mining

Course Objectives:

1. To provide a comprehensive understanding of the fundamental concepts, techniques, and processes involved in data mining.
2. To teach methods for data preprocessing, including cleaning, transformation, and reduction to prepare data for analysis.
3. To explore various data mining techniques such as classification, clustering, association rule mining, and anomaly detection.

Unit I: Data Warehousing:

Introduction, to Data warehousing, needs for developing data Warehouse, Data warehouse systems and its Components, Design of Data Warehouse, Dimension and Measures, Data Marts:- Dependent Data Marts, Independents Data Marts & Distributed Data Marts, Conceptual Modeling of Data Warehouses:-Star Schema, Snowflake Schema, Fact Constellations. Multidimensional Data Model & Aggregates.

Unit II: Online Analytical Processing:

OLAP, Characteristics of OLAP System, Motivation for using OLAP, Multidimensional View and Data Cube, Data Cube Implementations, Data Cube Operations, Guidelines for OLAP Implementation, Difference between OLAP & OLTP, OLAP Servers:- ROLAP, MOLAP, HOLAP Queries.

Unit III: Data Mining:

Introduction to Data Mining, Knowledge Discovery, Data Mining Functionalities, Data Mining System categorization and its Issues. Data Processing :- Data Cleaning, Data Integration and Transformation. Data Reduction, Data Mining Statistics. Guidelines for Successful Data Mining.

Unit IV: Association Rule Mining:

Association Rule Mining Introduction, Basic, The Task and a Naïve Algorithm, Apriori Algorithms, Improving the efficiency of the Apriori Algorithm, Apriori-Tid, Direct Hasing and Pruning(DHP),Dynamic Itemset Counting (DIC), Mining Frequent Patterns without Candidate Generation(FP-Growth),Performance Evaluation of Algorithms.

Unit V: Classification:

Classification Introduction, Decision Tree, The Tree Induction Algorithm, Split Algorithms Based on Information Theory, Split Algorithm Based on the Gini Index, Overfitting and Pruning, Decision Trees Rules, Naïve Bayes Method. Cluster Analysis:- Introduction, Desired Features of Cluster Analysis, Types of Cluster Analysis Methods:- Partitional Methods, Hierarchical Methods, Density-



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Based Methods, Dealing with Large Databases. Quality and Validity of Cluster Analysis Methods.

Reference Books:

1. Berson: Data Warehousing & Data Mining & OLAP , TMH
2. Jiawei Han and Micheline Kamber, Data Mining Concepts & Techniques, Elsevier Pub.
3. Arun.K.Pujari, Data Mining Techniques, University Press.
4. N.P Gopalan: Data Mining Technique & Trend, PHI
5. Hand, Mannila & Smith: Principle of Data Mining, PHI
6. Tan, Introduction to Data Mining, Pearson Pub.

Course Outcome:

At the end of the course, students should be able to:

1. Describe the key concepts and processes involved in data mining.
2. Implement data preprocessing techniques to prepare datasets for analysis.
3. Utilize various data mining techniques, including classification, clustering, and association rule mining.
4. Identify current trends and future research directions in data mining.



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Elective-V CSE8032 Cyber Law & Ethics

Course Objectives:

1. To provide a comprehensive understanding of the legal frameworks governing cyberspace and digital activities.
2. To discuss ethical considerations and responsibilities of IT professionals in cyber security.
3. To examine different types of cybercrimes, their impact, and legal responses.

Unit I: Cyber Law & Ethics:

Introduction Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level, Cyber Law - International Perspectives UN & International Telecommunication Union (ITU) Initiatives Council of Europe - Budapest Convention on Cybercrime, Asia-Pacific Economic Cooperation (APEC), Organization for Economic Co-operation and Development (OECD), World Bank, Commonwealth of Nations.

Unit II: Constitutional & Human Rights:

Constitutional & Human Rights Issues in Cyberspace Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace – Access to Internet, Right to Privacy, Right to Data Protection, Cyber Crimes & Legal Framework Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud Cyber terrorism, Cyber Defamation.

Unit III: Cyber Torts Cyber Defamation:

Cyber Torts Cyber Defamation, Different Types of Civil Wrongs under the IT Act 2000, Intellectual Property Issues in Cyber Space Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues.

Unit IV: E-Commerce Concepts:

E-Commerce Concept, E-commerce-Salient Features, Online approaches like B2B, B2C & C2C Online contracts, Click Wrap Contracts, Applicability of Indian Contract Act, 1872.

Unit V: Dispute Resolution:

Dispute resolution in cyberspace, Concept of Jurisdiction, Indian context of Jurisdiction and IT Act, 2000. International law and Jurisdictional issues in cyberspace, Dispute resolutions.

References Books:

1. Chris Reed & John Angel, Computer Law, OUP, New York.
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi.
3. Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute.



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4. Jonthan Rosenoer, Cyber Law, Springer, New York.
5. Sudhir Naib, The Information Technology Act, 2005: A Handbook, OUP, New York.
6. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd.

Course Outcome:

At the end of the course, students should be able to:

1. Describe the key principles and frameworks governing cyber laws.
2. Identify and analyze legal issues related to cybercrime and data protection.
3. Discuss the ethical responsibilities of IT professionals in relation to cyber security.
4. Identify and discuss the implications of emerging technologies on cyber law and ethics.



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Elective-V CSE8033 Machine Learning

Course Objectives:

1. To provide a foundational understanding of machine learning principles, techniques, and applications.
2. To explore supervised learning algorithms and their applications in prediction and classification tasks.
3. To study unsupervised learning techniques for clustering and dimensionality reduction.
4. To understand the importance of feature selection and extraction in improving model performance.
5. To analyze and discuss real-world applications of machine learning in various domains.

Unit I: Machine learning basics:

Machine learning basics: What is Machine Learning, Types and Applications of ML, Tools used, AI vs ML .Introduction to Neural Networks. Introduction to linear regression: SSE; gradient descent; closed form; normal equations; features, Introduction to classification: Classification problems; decision boundaries; nearest neighbor methods. Linear regression, SSE, gradient descent, closed form normal equations, features Overfitting and complexity training, validation, test data, and introduction to Matlab (II).

Unit II: Supervised Learning:

Introduction to Supervised Learning, Supervised learning setup, LMS, Linear Methods for Classification, Linear Methods for Regression, Support Vector Machines. Basis Expansions, Model Selection Procedures Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines, Model selection and feature selection, Decision Tree, Ensemble methods: Bagging, boosting, Evaluating and debugging learning algorithms. Classification problems; decision boundaries; nearest neighbor methods, Probability and classification, Bayes optimal decisions Naive Bayes and Gaussian class- conditional distribution, Linear classifiers Bayes' Rule and Naive Bayes Model, Logistic regression, online gradient descent, Neural Networks Decision tree and Review for Mid-term, Ensemble methods: Bagging, random forests, boosting A more detailed discussion on Decision Tree and Boosting.

Unit III: Reinforcement Learning:

REINFORCEMENT LEARNING: Markov decision process (MDP), HMM, Bellman equations, Value iteration and policy iteration, Linear quadratic regulation, Linear Quadratic Gaussian, Q-learning, Value function approximation, Policy search, Reinforce, POMDPs.

Unit IV: Unsupervised Learning:

Introduction to Unsupervised Learning: Association Rules, Cluster Analysis, Reinforcement



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Learning, Clustering K-means, EM. Mixture of Gaussians, Factor analysis, PCA (Principal components analysis), ICA (Independent components analysis);, hierarchical agglomeration Advanced discussion on clustering and EM, Latent space methods; PCA, Text representations; naive Bayes and multinomial models; clustering and latent space models, VC-dimension, structural risk minimization; margin methods and support vector machines (SVM), Support vector machines and large-margin classifiers Time series; Markov models; autoregressive models.

Unit V: Dimensionality Reduction:

Feature Extraction, Singular value decomposition. Feature selection – feature ranking and subset selection, filter, wrapper and embedded methods. Machine Learning for Big data: Big Data and MapReduce, Introduction to Real World ML, Choosing an Algorithm, Design and Analysis of ML Experiments, Common Software for ML.

Reference Books:

1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
2. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
3. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

Course Outcome:

At the end of the course, students should be able to:

1. Describe the key concepts and terminology used in machine learning.
2. Develop and apply supervised learning algorithms for classification and regression tasks.
3. Apply unsupervised learning techniques for clustering and data analysis.
4. Implement feature selection and extraction techniques to enhance model performance.



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Elective-V CSE8034 Computer Peripherals & Interfaces

Course Objectives:

1. To provide a comprehensive understanding of various computer peripherals and their functions.
2. To study various types of peripheral devices, including input, output, and storage devices.
3. To discuss the integration of peripherals within computer systems.
4. To analyze the impact of emerging technologies on computer peripherals and interfaces.

Unit I: System Resources:

System Resources Interrupt, DMA Channel, I/O Port Addresses and resolving and resolving the conflict of resources. I/O buses- ISA, EISA, Local bus, VESA Local bus, PCI bus, PCI Express, Accelerated graphics port bus.

Unit II: IDE & SCSI Interfaces:

IDE & SCSI Interfaces: IDE origin, IDE Interface ATA standards ATA1 to ATA7. ATA feature, ATA RAID and SCSI RAID, SCSI Cable and pin Connector pin outs SCSI V/s IDE Advantages and limitation.

Unit III: Video Hardware:

Video Hardware: video display technologies, DVI Digital signals for CRT Monitor, LCD Panels, Video adapter types, Integrated Video/ Motherboard chipset, Video RAM, Video driver and multiple Monitor, Graphic accelerators. Advanced 3D Technologies, TV Tuner and Video Capture upgrades troubleshooting Video Cards and Drivers.

Unit IV: I/O Interfaces:

I/O Interfaces from USB and IEEE1394, I/O Interface from serial and Parallel to IEEE1394 and USB 961, Parallel to SCSI converter. Testing of serial and parallel port, USB Mouse/ Keyboard Interfaces.

Unit V: Input/ Output Driver Software Aspects:

Role of device driver DOS and UNIX/ LINUX device drivers, Design & Integration of Peripheral devices to a computer system as a Case Study Future Trends: Detailed Analysis of recent Progress in the Peripheral and Bus systems. Some aspects of cost Performance analysis while designing the system.

Reference Books:

1. P. Pal Chandhari , “Computer Organization and design” Prentice Hall of India Pvt.Ltd, 1994
2. Del Corso, H.Kirrman, JD Nicond “Microcomputer buses & links” Academic Press 1986.
3. Douglas V Hall “Microprocessor & Interfacing Programming & H/W” McGraw Hill International 2nd Edition 1992.



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4. Scott Muller, “Upgrading and repairing PC”

Course Outcome:

At the end of the course, students should be able to:

1. Describe the different types of computer peripherals and their roles in computing.
2. Explain various interface standards (e.g., USB, HDMI, Bluetooth) and their applications.
3. Demonstrate the ability to connect and configure various input, output, and storage devices.
4. Successfully integrate peripherals into a computer system.
5. Work on hands-on projects involving peripheral connections and configurations.