5th Semester

MCA

Syllabus

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T501: Internet and Web Technology
T502: Data Mining & Soft Computing
T503: Management Information System & E-Commerce
T504: Elective-II
L505: Data Mining & Soft Computing Laboratory
L506: Elective-II Laboratory

List of Electives (II)

T504: Image Processing
T504: Wireless Sensor Network
T504: Real Time System
T504: Cloud Computing
T504: Social Network
T504: Pattern Recognition
T504: Big Data Analysis
T504: Theory of Computation
T504: Discrete Dynamical System

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T501: Internet and Web Technology

Unit I: The Internet and WWW: Understanding the WWW and the Internet, Emergence of Web, Web Servers, Web Browsers, Protocols, Building Web Sites, HTML, Planning for designing Web pages, Model and structure for a Website, Developing Websites, Basic HTML, HTML tags, color background, using images links, Lists, Tables and Forms, Frames for designing a good interactive website


Unit III: Java Language Basics: Concepts of Object Oriented Programming, Java constants, Java variables, Data Types, Operators, Decision making and branching, Looping, arrays, function structures, union, pointer, classes, file management, AWT, Graphics

Unit IV: Java Applet, Multithreading, Interfaces, Packages: Introduction to Java applets, Writing Java Applets, Life cycle of applet, Multithreading, Interfaces, Packages

Textbooks:

Reference Books:
T502: Data Mining & Soft Computing

UNIT I: Knowledge discovery in Databases, Data Mining Processes, Data Mining Software-WEKA, KEEL, Introduction to Association Rule Mining, Apriori Algorithms, Introduction to Classification, classification algorithms- Decision Trees, Bayesian classifier, K-nearest neighbor classifier, Neural network based classifier. Introduction to Clustering, Types of Clustering, Clustering Algorithms,


TEXT BOOKS:
1. J. Han, M. Kamber, and J. Pei, Data Mining: Concepts and Techniques, 3rd Edition, Morgan Kaufmann Series.
Reference Books:

1. Simon Haykin, Neural Networks A Comprehensive Foundation, Pearson Education.
3. B. Yegnanarayana, Artificial Neural Networks, PHI.
4. A.P. Engelbrecht, Computational Intelligence An Introduction, Joh Wiley & Sons Ltd.
T503: Management Information System & E-Commerce

Unit I: Need, Purpose and Objectives of MIS. Contemporary Approaches to MIS. Information as a strategic resource. Use of information for competitive advantage MIS as an instrument for the organizational change Models of Decision Making -Classical, Administrative and Herbert Simon's Models. Attributes of information and its relevance to Decision Making, Types of information.


Text Books
L 505: Data Mining & Soft Computing Laboratory

- Learning of WEKA and KEEL Tool.
- Development of Program for different classification techniques:
  a) Minimum Distance Classifier.
  b) K-nn.
  c) Bayesian Classifier.
  d) Decision Tree (IDB)
- Development of Program for Association Rule mining Technique like
  a) Apriori.
  b) Genetic Based Apriori.
- Development of Maximal for clustering Technique.
  a) K-means
  b) K-modes
  c) K-medicos
  d) Fuzzy K-Means
T504: Elective-II

T504: Image Processing

**Unit I:** Digital image processing: problems and applications, image representation, fundamental steps in image processing, components of an image processing system, A simple image model, sampling and quantization, basic relationships between pixels.

**Unit II:** Image enhancement in spatial domain: Basic gray level transformations, Histogram Processing, Enhancement using arithmetic/logic operations, Spatial filtering, colour image processing: Color fundamentals, Color models, Pseudocolor Image processing, Color transformations.

**Unit III:** Image Restoration: Image degradation/ restoration process model, Noise models, algebraic approach to restoration, image compression, image compression models, elements of information theory, error free compression, Lossy compression.

**Unit IV:** Morphological Image processing: preliminaries, Dilation and erosion, Opening and Closing, Hit-or-Miss transformation, Basic morphological algorithms, Image segmentation: detection of discontinuities, Edge linking and boundary detection, thresholding.

**TEXT BOOKS:**


T504: Wireless Sensor Networks

Unit I: Routing Cellular and Ad hoc wireless networks; Issues of MAC layer and outing; Proactive, Reactive and Hybrid Routing protocols; Multicast Routing; Tree based and Mesh based protocols; Multicast with Quality of Service Provision Quality of Service: Real-time traffic support; Issues and challenges in providing QoS; Classification of QoS Solutions; MAC layer classifications; QoS Aware Routing Protocols; Ticket based and Predictive location based Qos Routing Protocols.

Unit II: Energy Management Ad Hoc Networks: Need for Energy Management; Classification of Energy Management Schemes; Battery Management and Transmission Power Management Schemes; Network Layer and Data Link Layer Solutions; System power Management schemes

Unit III: Mesh Networks: Necessity for Mesh Networks; MAC enhancements; IEEE 802.11s Architecture; Opportunistic Routing; Self Configuration and Auto Configuration; Capacity Models; Fairness; Heterogeneous Mesh Networks; Vehicular Mesh Networks

Unit IV: Sensor Networks: Introduction to Sensor Network architecture; Data Dissemination; Data Gathering; MAC Protocols for sensor Networks; Location discovery; Quality of Sensor Networks; Evolving Standards.

TEXT BOOK:

Reference Books:
T504: Real Time System

UNIT I: Introduction: Issues in real-time system, task classes, architecture issues, operating system. Issues, performance measure for real time systems, estimating program run times, classical uniprocessor scheduling algorithm, uniprocessor scheduling of IRIS tasks, task assignment, mode changes, fault tolerance scheduling.

UNIT II: Programming Languages and Tools: Introduction, desirable languages characteristics, data types, control structures, facilitating hierarchical decomposition packages, exception handling, overloading and generics, multitasking, low-level programming, task scheduling, timing specification, programming environments, run-time support.

UNIT III: Real-Time Database & Communication: Basic definitions, real time vs. general purpose databases, main memory databases, transaction priorities, transaction aborts, concurrency control issues, disk scheduling algorithms, two-phase approach to improve predictability, maintaining serialization consistency, databases for real-time systems, communication network topologies, communication protocols.

UNIT IV: Fault-Tolerance Techniques: Introduction, failure causes, fault types, fault detection, fault and error containment, redundancy, data diversity, reversal checks, malicious or Byzantine failures, integrated failure handling.

Reliability & Clock Synchronization: Introduction, obtaining parameter values, reliability models for hardware redundancy, software error models, taking time into account, clock synchronization, nonfault-tolerant synchronization algorithms, impact of faults, fault tolerant synchronization in hardware.

Text Book:

Reference Books:
T504: Cloud Computing

Unit I: Cloud Computing Fundamental: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications. Cloud Applications: Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages.

Unit II: Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics: Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat).

Unit III: Application Development: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App.

Unit IV: Best Practice Cloud IT Model: Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud based service, applications and development platform deployment so as to improve the total cost of ownership (TCO)

Text Books:
T504: SOCIAL NETWORK

Unit I: **Introduction**: Introduction and terminology, market views, applications, the business of social networking, Examples of social media-multimedia, entertainment, news/opinion, communication, major social networks, social networking websites. Basic properties of networks and actors, connections embedding, Centrality and power, Cliques and sub-groups, Network positions and social roles: The analysis of equivalence, Similar and Structural equivalence, Automorphic equivalence, Regular equivalence, Multiplex network, Two mode networks

Unit II: **Current Situation In Selected Areas Of Social Networks**: Social Graphs, Social graph expansion, Facebook open graph, Microblogging, Identity Algorithms And Apis, OAuth, Social Media Search And Management In Large Scale, Social media search, Content management in large scale, Human powered and community question answering, Mobility And Geolocation, Social Rankings And Vertical Social Networks, Business And Social Networking, Social Businesses, Social Analytic tools, Social Television, Social Gaming, Social Networks - Research Challenges,

Unit III: **Social network data**: Social network data, statistical tools, Populations, samples, and boundaries, Modality and levels of analysis, Sampling ties, Formal methods, Full network methods, Snowball methods, Ego-centric networks (with alter connections), Ego-centric networks (ego only), Multiple relations, Scales of measurement, Binary measures of relations, Multiple-category nominal measures of relations, Grouped ordinal measures of relations, Full-rank ordinal measures of relations, Interval measures of relations, statistics and social network data

Unit IV: **Using graphs and matrix to represent social relations**: Graphs and Sociograms, Kinds of Graphs, Levels of Measurement: Binary, Signed, and Valued Graphs, Directed or "Bonded" Ties in the Graph, Simplex or Multiplex Relations in the Graph, working with Netdraw to visualize graphs, Matrices to Represent Social Relations, the "Adjacency" Matrix, Matrix Permutation, Blocks, and Images, Mathematical Operations on Matrices, working with network data.

**Text Books:**


**Reference Books:**


T504: PATTERN RECOGNITION


Unit II: Statistical Patten Recognition: Bayesian Decision Theory, Classifiers, Normal density and discriminant functions. Classifier based on Bayes Decision Theory, Linear classifier: Least square methods, Mean square estimation, Support vector machines, nonlinear classifier: Two layer & three layer perceptron, Back propagation algorithm, combining classifiers

Unit III: Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods – Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.


Text Books:
4. Sergios Theodoridis & Konstantinous Koutroumbas, Pattern Recognition, Elsevier
T504: Big Data Analysis

UNIT I: Introduction to Big Data Analytics, Overview of SQL and intro to R

UNIT II: Using R for Initial Analysis of the Data

UNIT III: Advanced Analytics and Statistical Modeling for Big Data – Theory and Methods, Technology and Tools

UNIT IV: Concluding and Operationalizing an Analytics Project, Big Data Analytics Lifecycle

Text Book:

T504: Theory of Computation


UNIT II: Regular Languages & Grammars: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma for regular sets, closure properties of regular sets. right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion.


UNIT IV: Turing Machine: definition, model, Representation of TMs, Types of TMs , Language acceptability by TMs, design of TM, Computable functions, recursively enumerable languages, Universal TMs, Halting problem, NP-Completeness.

Text Books:

**T504: Discrete Dynamical System.**

**Unit I:** Linear Maps and Linearization, Contractions in Euclidean Space, Interval Maps, Limit Cycles, Quadratic maps, Metric Spaces, Fractals., Linear Maps, Circle Rotations, Distribution of Values, Linear Toral Flows, Linear ODEs and Lissajous.

**Unit II:** Interval Flows and Billiards, Invertible Circle Maps, comments on n-tori, Volume Preservation, Poincare Recurrence, Poincare Recurrence, Newton’s Equation, Billiards, Billiard Examples, Convex Billiards.

**Unit III:** Growth of Periodic Orbits, Hyperbolic Toral Maps, Hyperbolic Toral Maps, Inverse Limits, Topological Transitivity, Topological Mixing and Chaos, Topological Mixing and Chaos,

**Unit IV:** Compact Space Dimension, Topological Entropy, Topological Entropy, Quadratic Maps and Chaos

**Text Book:**