RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Computer Science and Engineering VIII-Semester

CS-8001 Soft Computing

1. 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.

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

3. 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, Fuzzyfication, rule based design & inferencing, defuzzyfication, applications of fuzzy system.

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

5. Advanced soft computing techniques: Rough Set Theory - Introduction, Set approximation, Rough membership, Attributes, optimization. SVM - Introduction, obtaining the optimal hyper plane, linear and nonlinear SVM classifiers. Introduction to Swarm Intelligence, Swarm Intelligence Techniques: Ant Colony Optimization, Particle Swarm Optimization, Bee Colony Optimization etc.

References :

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, 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 & Appli.,PHI Pub. Hagen, Neural Network Design, Cengage Learning

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Credit Based Grading System

Computer Science and Engineering VIII-Semester

CS-8002 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 Secutity 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

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 .

References –
1. Buyya, Selvi ,” Mastering Cloud Computing “,TMH Pub
2. Kumar Saurabh, “Cloud Computing” , Wiley Pub
3. Krutz , Vines, “Cloud Security “ , Wiley Pub
4. Velte, “Cloud Computing- A Practical Approach” ,TMH Pub
5. Sosinsky, “ Cloud Computing” , Wiley Pub

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Computer Science and Engineering VIII-Semester

CS-8003 Elective-V (1) Machine Learning

UNIT-I
INTRODUCTION
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: 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 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

References:

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

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Computer Science and Engineering VIII-Semester

CS-8003 Elective-V (2) Data Mining

Unit-I: 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: 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: 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:-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:-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- Based Methods, Dealing with Large Databases. Quality and Validity of Cluster Analysis Methods.

 References:
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.

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Computer Science and Engineering VIII-Semester

CS-8003 Elective-V (3) Computer Peripherals & Interfaces

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.

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.

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.

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.

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.
4. Scott Muller, "Upgrading and repairing PC"

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Computer Science and Engineering VIII-Semester

CS-8004 Elective-VI (1) Cyber Law & Ethics

Unit-1:

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-2:

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-3

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-4

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-5

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.
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.

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Computer Science and Engineering VIII-Semester

CS-8004 Elective-VI (2) Augmented & Virtual Reality

Unit-1
Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality. Multiple Modals of Input and Output Interface in Virtual Reality: Input -Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual / Auditory / Haptic Devices.

Unit-2
Visual Computation in Virtual Reality: Fundamentals of Computer Graphics. Software and Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management of Large Scale Environments & Real Time Rendering.

Unit-3
Environment Modeling in Virtual Reality: Geometric Modeling, Behavior Simulation, Physically Based Simulation, **Interactive Techniques in Virtual Reality:** Body Track, Hand Gesture, 3D Manus, Object• Grasp

Unit-4
Introduction of Augmented Reality (AR): System Structure of Augmented Reality. Key Technology in AR. **Development Tools, and Frameworks in Virtual Reality:** Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools.

Unit-5
Application of VR in Digital Entertainment: VR Technology in Film & TV Production.VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR, VR Development Tools Frameworks of Software Development Tools in VR, Modeling Tools for VR, X3D Standard; Vega, MultiGen, Virtools.

References:
1. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
2. Sherman, William R. and Alan B. Craig. Understanding Virtual Reality – Interface, Application, and Design, Morgan Kaufmann, 2002.
3. Fei GAO. Design and Development of Virtual Reality Application System, Tsinghua Press, March 2012

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Computer Science and Engineering VIII-Semester

CS-8004 Elective-VI (3) Advance Computer Networks

UNIT 1:
Review of Networking and O.S. fundamentals, ISO-OSI Model, different layers and their functions, LAN, MAN, WAN, Communication media & principles IEEE standards etc.

UNIT 2:
Internetworking with TCP/IP, Basic concepts, Principles, Protocols and Architecture, Address handling Internet protocols and protocol layering. DNS, Applications: TELNET, RLOGN , FTP, TFTP, NFS, SMTP, POPL, IMAP, MIME, HTTP,STTP,DHCP, VOIP, SNMP.

UNIT 3:
Introduction to Router, Configuring a Router, Interior & Exterior Routing, RIP, Distance Vector Routing, OSPF, BGP, Uni-cast, Multicast and Broadcast. **Multicast routing protocols:** DVMRP, MOSPF, CBT, PIM, MBONE, EIGRP, CIDR, Multicast Trees, Comparative study of IPv6 and IPv4.

UNIT 4:
VPN addressing and routing, VPN Host management, ATM Concepts, Services Architecture, Equipments and Implementation

UNIT 5:
Introduction to wireless transmission and medium access control, wireless LAN: IEEE 802.11, Hipher LAN , Bluetooth Mobile Network and Transport layer, WAP GSM and CDMA: Network architecture and management

Reference Books:

1. Computer Networks: Tanenbaum.
2. Internetworking with TCP/IP: Comer.
3. Data Communications, Computer Networks and Open Systems: Hallsall.
4. Data Communications, Stalling.
5. Mobile Communication: Schiller, Pearson Education.