RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII- semester

IT 701 Soft Computing

Course Objective:
The objective of this course is to familiarize the students with different soft computing tools to use them to be able to solve complex problems

Unit I Introduction to Neural Network: Concept, biological neural network, comparison of ANN with biological NN, evolution of artificial neural network, Basic models, Types of learning, Linear separability, XOR problem, McCulloch-Pitts neuron model, Hebb rule.

Unit II Supervised Learning: Perceptron learning, Single layer/multilayer, Adaline, Madaline, Back propagation network, RBFN, Application of Neural network in forecasting, data compression and image compression.

Unit III Unsupervised learning: Introduction, Fixed weight competitive nets, Kohonen SOM, Counter Propagation networks, (Theory, Architecture, Flow Chart, Training Algorithm and applications). Introduction to Convolutional neural networks (CNN) and Recurrent neural networks (RNN).

Unit IV Fuzzy Set: Introduction, Basic Definition and Terminology, Properties and Set-theoretic Operations, , Fuzzy Relations , Membership Functions and their assignment, Fuzzy rules and fuzzy Reasoning, Fuzzy if-then Rules, Fuzzy Inference Systems. Application of Fuzzy logic in solving engineering problems.

Unit V Genetic Algorithm: Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation, convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problems like TSP (Travelling salesman problem), Network design routing. Introduction to Ant Colony optimization (ACO) and Particle swarm optimization (PSO).

References-

1. S.N. Shivnandam, “Principle of soft computing”, Wiley.
2. S. Rajshekaran and G.A.V. Pai, “Neural Network , Fuzzy logic And Genetic Algorithm”, PHI.
3. Jack M. Zurada, “Introduction to Artificial Neural Network System” JAico Publication.
4. Simon Haykins, “Neural Network- A Comprehensive Foudation”
5. Timothy J.Ross, “Fuzzy logic with Engineering Applications”, McGraw-Hills 1.

Suggested List of Experiments-

1. Form a perceptron net for basic logic gates with binary input and output.
2. Using Adaline net, generate XOR function with bipolar inputs and targets.
3. Calculation of new weights for a Back propagation network, given the values of input pattern, output pattern, target output, learning rate and activation function.
4. Design fuzzy inference system for a given problem.
5. Maximize the function $y = 3x^2 + 2$ for some given values of x using Genetic algorithm.
6. Implement Travelling salesman problem using Genetic Algorithm.
7. Optimisation of problem like Job shop scheduling using Genetic algorithm

Course Outcomes:

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

1. Understand concept of ANN and explain the XOR problem
2. Use supervised neural networks to classify given inputs
3. Understand unsupervised neural networks for clustering data .
4. Build Fuzzy inference system using concepts of fuzzy logic.
5. Obtain an optimized solution to a given problem using genetic algorithm.

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Departmental Elective IT 702(A) Data Science

Course Objective:
The objective of this course is to familiarize students with the roles of a data scientist and enable them to analyze data to derive meaningful information from it.

Unit I Data Science and Big Data Overview: Types of data, Sources of data, Data collection, Data storage and management, Big Data Overview, Characterization of Big data, Drivers of Big Data, Challenges, Big Data Use Cases, Defining Big Data Analytics and examples of its use cases, Data Analytics Lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize.

Unit II Advanced Analytical Theory and Methods: Clustering, K-means, Additional Clustering Algorithms, Association Rules, Apriori Algorithm, Applications of Association Rules, Regression, Linear Regression, Logistic Regression, Classification, Decision Trees, Naive Bayes, Additional Classification Methods, Text Analysis, Text Analysis Steps, Determining Sentiments.

Unit III Advanced Analytics-Technology and Tools: Analytics for Unstructured Data Use Cases, MapReduce, Apache Hadoop,Traditional database vs Hadoop, Hadoop Core Components, HDFS, Design of HDFS, HDFS Components, HDFS Architecture, Hadoop 2.0 Architecture, Hadoop-2.0 Resource Management, YARN.

Unit IV The Hadoop Ecosystem: Introduction to Hive, Hbase, HiveUse Cases: Facebook, Healthcare; Hive Architecture, Hive Components. Integrating Data Sources, Dealing with Real-Time Data Streams and Complex Event Processing, Overview of Pig, Difference between Hive and Pig, Use Cases of Pig, Pig program structure, Pig Components, Pig Execution, Pig data models, Overview of Mahout, Mahout working.

Unit V Introduction to R, Basic Data Analytics Methods Using R, Communicating and Operationalizing an Analytics Project, Creating the Final Deliverables, Data Visualization Basics.

References:

1. EMC Education Services, “Data Science and Big Data Analytics”, Wiley, 2015.
2. Judith Hurwitz, Alan Nugent, Fern Halper, and Marcia Kaufman, “Big Data for Dummies”,Wiley & Sons, 2013.
3. VigneshPrajapati, “Big Data Analytics with R and Hadoop” ,Packt Publishing, 2013.
4. David Dietrich, Barry Heller, and Beibei Yang“Data Science and Big Data Analytics:Discovering, Analyzing, Visualizing and Presenting Data”, John Wiley & Sons, Inc.

Course Outcomes:
After the completion of this course, the students will be able to:

1. Demonstrate proficiency with statistical analysis of data.

2. Build and assess data-based models.
3. Execute statistical analyses with professional statistical software.
4. Demonstrate skill in data management.
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Departmental Elective IT 702(B) Cloud Computing

Course Objective:
The objective of this course is to provide students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications.

UNIT I
Introduction of Grid and Cloud computing, characteristics, components, business and IT perspective, cloud services requirements, cloud models, Security in public model, public verses private clouds, Cloud computing platforms: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing.

UNIT II
Cloud services- SAAS, PAAS, IAAS, cloud design and implementation using SOA, conceptual cloud model, cloud stack, computing on demand, Information life cycle management, cloud analytics, information security, virtual desktop infrastructure, storage cloud.

UNIT III
Virtualization technology: Definition, benefits, sensor virtualization, HVM, study of hypervisor, logical partitioning- LPAR, Storage virtualization, SAN, NAS, cloud server virtualization, virtualized data center.

UNIT IV
Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud, Cloud computing security architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro- architectures; Identity Management and Access control-Identity management, Access control, Autonomic Security, Cloud computing security challenges: Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

UNIT V
SOA and cloud, SOA and IAAS, cloud infrastructure benchmarks, OLAP, business intelligence, e-Business, ISV, Cloud performance monitoring commands, issues in cloud computing. QOS issues in cloud, mobile cloud computing, Inter cloud issues, Sky computing, Cloud Computing Platform, Xen Cloud Platform, Eucalyptus, OpenNebula, Nimbus, TPlatform, Apache Virtual Computing Lab (VCL), Anomaly Elastic Computing Platform.

References:
1. Dr.Kumar Saurabh, “Cloud Computing”, Wiley India.
2. Ronald Krutz and Russell Dean Vines, “Cloud Security”, Wiley-India.
3. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, “Computing for Dummies”, Wiley India Edition.
4. Anthony T.Velte Toby J.Velte, “Cloud Computing – A Practical Approach”, TMH.
5. Barrie Sosinsky, ‘Cloud Computing Bible”, Wiley India.

Course Outcomes:
After the completion of this course, the students will be able to:

1. Explain the core concepts of the cloud computing paradigm
2. Demonstrate knowledge of virtualization
3. Explain the core issues of cloud computing such as security, privacy, and interoperability.
4. Choose the appropriate technologies, algorithms, and approaches for the related issues.
5. Identify problems, and explain, analyze, and evaluate various cloud computing solutions.

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Departmental Elective IT 702(C) SIMULATION & MODELING

Course Objective:
The objective of this course is to introduce students to basic simulation methods and tools for modeling and simulation of continuous, discrete and combined systems. The objective is to impart knowledge of simulation principles. The ability to create simulation models of various types.

Unit I
Modeling & Simulation Concepts Modeling & Simulation Concepts: System Concepts, What is a Model? Type of Models, Modeling & Simulation, Continuous vs. Discrete System Simulation, Numerical Integration vs. Continuous Simulation, Analog vs. Digital Simulation, Simulation vs. Monte- Carlo Simulation, Nature of Computer Modeling and Simulation, When to Use Simulation? Limitations of Simulation

Unit II
Probability Concepts in Simulation Stochastic variables, Random numbers: Pseudo-random generators, Testing of Pseudo-random number generators, Generation of non-uniformly distributed random numbers, discrete and continuous random variables, and density and distributive functions. Study of few distributions such as Poisson, Normal, Uniform

Unit III
Simulation of Continuous Systems Introduction, Differential equations, Pure Pursuit Problem, Simulation of Chemical Reaction, Autopilot Simulation and Simulation of other Continuous systems

Unit IV
Simulation of Discrete Systems Arrival patterns and service times, Simulation of Queuing System - Elementary idea about networks of Queuing with particular emphasis to computer system environment

Unit V
Verification & Validation Design of simulation experiments and validation of simulation experiments comparing model data units and real system data
Simulation Language A brief introduction to important discrete and continuous languages such as GPSS (Study & use of the language). Use of data base & AI techniques in the area of modeling and simulation

References:

1. Deo, Narsing “System Simulation with Digital Computers”
2. Gorden G, “System Simulation”, Prentice Hall
3. Shridhar Bhai Trivedi, Kishore “Probability & Statistics with reliability Queuing, Computer Science Applications”
4. Payer, T.A., “Introduction to System Simulation”, McGraw Hill
5. Reitman, J, “Computer Simulation Application”, Wiley
6. Barnes B, “Modeling and Performance Measurement of Computer System
7. Spriet, WIA. “Computer Aided Modeling and Simulation (Academic Press).

Course Outcomes:
After the completion of this course, the students will be able to:

1. Define, describe and apply basic concepts related to modeling, identification and simulation
2. Classify various simulation models and give practical examples for each category.
3. Demonstrate the ability to apply knowledge of probability and statistics for *simulation & modeling*,
4. Generate and test random numbers and apply them to develop simulation models.
5. Construct a model for a given set of data and motivate its validity.

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Departmental Elective IT 702(D) Augmented and Virtual Reality

Course Objective:
The objective of this course is to provide students a general introduction of Virtual and Augmented Environments followed by an analysis of features, requirement and issues in real-life applications.

Unit I Introduction to Virtual Reality- Virtual Reality and Virtual Environment: Introduction, Applications of Virtual Reality, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark 3D Computer Graphics: Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, 3D clipping, Colour theory, Simple 3D modeling, Illumination models, Reflection models, Shading algorithms, Radiosity, Hidden Surface Removal, Realism-Stereographic image.

Unit II Geometric Modeling- Geometric Modeling: Introduction, From 2D to 3D, 3D space curves, 3D boundary representation Geometrical Transformations: Introduction, Frames of reference, Modeling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.

Unit III Virtual Environment -Animating the Virtual Environment: Introduction, The dynamics of numbers, Linear and Nonlinear interpolation, the animation of objects, linear and non-linear translation, shape & object in betweening, free from deformation, particle system. Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, springs, Flight dynamics of an aircraft.

Unit IV VR Hardware and Software- Human factors: Introduction, the eye, the ear, the somatic senses. VR Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware, Integrated VR systems. VR Software: Introduction, Modeling virtual world, Physical simulation, VR toolkits, Introduction to VRML

Unit V Augmented and Mixed Reality- Taxonomy, Technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

References:

1. John Vince, “Virtual Reality Systems “, Pearson Education Asia, 2007.
2. Anand R., “Augmented and Virtual Reality”, Khanna Publishing House, Delhi.
3. Adams, “Visualizations of Virtual Reality”, Tata McGraw Hill, 2000.
4. Grigore C. Burdea, Philippe Coiffet , “Virtual Reality Technology”, Wiley Inter Science, 2 nd Edition, 2006.
5. William R. Sherman, Alan B. Craig, “Understanding Virtual Reality: Interface, Application and Design”, Morgan Kaufmann, 2008.
6. Alan B Craig, William R Sherman and Jeffrey D Will, Developing Virtual Reality Applications: Foundations of Effective Design, Morgan Kaufmann, 2009.

7. Gerard Jounghyun Kim, Designing Virtual Systems: The Structured Approach, 2005.
8. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

Course Outcomes:

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

1. Demonstrate knowledge of virtual reality and its applications
2. To describe the importance of viewing and projections.
3. Understand geometric modeling and Virtual environment.
4. Explain about virtual reality hardware and software
5. Develop Virtual Reality applications.

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Open Elective IT 703 (A) Cyber Laws and Forensics

Course Objective:
The objective of this course is to emphasize the importance of cyber laws and digital forensics, and to prepare students to conduct a digital investigation in an organized and systematic way.

UNIT-I Introduction to cybercrime, definition, cyber crime and information security, classification of cybercrimes, cybercrime: the legal perspectives, an Indian perspective, cybercrime and the Indian ITA 2000, a global perspective on cybercrime, Cyber offences: How criminals plan them, Tools and methods used in cyber crime, Need of cyber law, The Indian IT act, challenges to Indian law and cybercrime scenario in India, digital signature and Indian IT act, Amendments in the Indian IT act, cybercrime and punishment

UNIT-II Law and framework for information security, law for intellectual property rights(IPR), patent law, copy right law, Indian copyright act, privacy issue and law in Hong Kong, Japan, and Australia, data protection act in Europe, health insurance portability and accountability act of 1996(HIPAA), Gramm-leach-Bliley act of 1999(GLAB),Sarbanes-Oxley(SOX), legal issue in data mining, building security into software/system development life cycle.

UNIT III Digital forensics Science, The need for computer forensics, Understanding computer forensics, computer forensics versus other related disciplines, A brief History of computer Forensics, Cyber forensics and digital evidence, Digital forensics lifecycle, chain of custody concept, Network forensics, Approaching a computer forensics investigation, setting up a computer forensics laboratory, Forensics and social networking sites, computer forensics from compliance perspective, challenges in computer forensics, forensics auditing, antiforensics

UNIT IV Current Computer Forensics Tools, Evaluating Computer Forensics Tool Needs, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools, Tool Comparisons, Other Considerations for Tools, Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools, Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations

UNIT V Forensics of hand held devices, Investigating Network Intrusions and Cyber Crime, Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks ,Router Forensics. Cyber forensics tools and case studies.

References:
1) The Indian Cyber law with Cyber glossary, Suresh T. Vishwanathan, New Delhi, Bhart Law House, 2000.
2) Law of Cyber Crimes and Information Technology Law, S.V. JogaRao, 2007.
3) Cory Altheide, Harlan Carvey, Digital Forensics with Open Source Tools, Syngress imprint of Elsevier.
4) Bill Nelson, Amelia Phillips, Christopher Steuart, “Guide to Computer Forensics and Investigations”, Fourth Edition, Course Technology.
5. Angus M. Marshall, “Digital forensics: Digital evidence in criminal investigation”, John – Wiley and Sons, 2008.

6. Nina Godbole and Sunit Belapure– Cyber Security, Wiley India Publication.
7. Nina Godbole, Information system security, Wiley India Publication.
8. Information Warfare: Corporate attack and defense in digital world, William

Course Outcomes:

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

1. Become aware of various cyber crimes and cyber laws
2. Underline the need of digital forensic and role of digital evidences
3. Understand different types of digital evidences that can be presented to support investigations
4. List the methods to generate legal evidence and supporting investigation reports
5. Use various digital forensic tools

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Information Technology, VII-Semester

Open Elective IT 703 (B) Internet of Things

Course Objective:
The objective of this course is to provide an understanding of the technologies and the standards relating to the Internet of Things and to develop skills on IoT technical planning.

Unit I IoT definition, Characteristics, IoT conceptual and architectural framework, Physical and logical design of IoT, IoT enablers, Modern day IoT applications, M2M communications, IoT vs M2M, IoT vs WoT, IoT reference architecture, IoT Network configurations, IoT LAN, IoT WAN, IoT Node, IoT Gateway, IoT Proxy, IPv4 vs IPV6

Unit II Sensor, Basic components and challenges of a sensor node, Sensor features, Sensor resolution; Sensor classes: Analog, Digital, Scalar, Vector Sensors; Sensor Types, bias, drift, Hysteresis error, quantization error; Actuator; Actuator types: Hydraulic, Pneumatic, electrical, thermal/magnetic, mechanical actuators, soft actuators

Unit III Basics of IoT Networking, IoT Components, Functional components of IoT, IoT service oriented architecture, IoT challenges, 6LowPAN, IEEE 802.15.4, ZigBee and its types, RFID Features, RFID working principle and applications, NFC (Near Field communication), Bluetooth, Wireless Sensor Networks and its Applications

Unit IV MQTT, MQTT methods and components, MQTT communication, topics and applications, SMQTT, CoAP, CoAP message types, CoAP Request-Response model, XMPP, AMQP features and components, AMQP frame types

Unit V IoT Platforms, Arduino, Raspberry Pi Board, Other IoT Platforms; Data Analytics for IoT, Cloud for IoT, Cloud storage models & communication APIs, IoT case studies

References:
1. Vijay Madisetti, Arshdeep Bahga, “Ïnternet of Things, A Hands on Approach”, University Press
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, “Introduction to Internet of Things: A practical Approach”, ETI Labs
3. Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press
4. Jeeva Jose, “Internet of Things”, Khanna Publishing House, Delhi
5. Adrian McEwen, “Designing the Internet of Things”, Wiley
6. Raj Kamal, “Internet of Things: Architecture and Design”, McGraw Hill
7. Cuno Pfister, “Getting Started with the Internet of Things”, O Reilly Media

Course Outcomes:
After the completion of this course, the students will be able to:
1. Understand Internet of Things and its hardware and software components

2. Interface I/O devices, sensors & communication modules
3. Analyze data from various sources in real-time and take necessary actions in an intelligent fashion
4. Remotely monitor data and control devices
5. Develop real life IoT based projects

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Open Elective IT 703 (C) Social Networks

Course Objective:
The objective of this course is to focus on the importance of social network analysis and to enhance skills of students for analyzing social media and networking data.

UNIT I Introduction Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II Modelling, Aggregating and Knowledge Representation Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

UNIT III Extraction and Mining Communities in Web Social Networks Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - MultiRelational characterization of dynamic social network communities.

UNIT IV Predicting Human Behaviour and Privacy Issues Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT V Visualization and Applications of Social Networks Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

References:

1. Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, ―Computational Social Network Analysis: Trends, Tools and Research Advances‖, Springer, 2012
2. Borko Furht, ―Handbook of Social Network Technologies and Applications‖, Springer, 1st edition, 2011
3. Charu C. Aggarwal, ―Social Network Data Analytics‖, Springer; 2014
4. Giles, Mark Smith, John Yen, ―Advances in Social Network Mining and Analysis‖, Springer, 2010.

5. Guandong Xu , Yanchun Zhang and Lin Li, ―Web Mining and Social Networking – Techniques and applications‖, Springer, 1st edition, 2012
6. Peter Mika, ―Social Networks and the Semantic Web, Springer, 1st edition, 2007.
7. Przemyslaw Kazienko, Nitesh Chawla,‖Applications of Social Media and Social Network Analysis‖, Springer,2015
8. Maksim Tsvetovat and Alexander Kouznetsov , "Social Network Analysis for Startups", O'Reilly Media, 2011.
9. Charles Kadushin, "Understanding Social Networks", Oxford University Press, 2012
10. Social Network Analysis: Theory and Applications

Course Outcomes:

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

1. Understand the importance of social media and networks
2. Have skills for analyzing social media and networking data
3. Visualize social networks
4. Create real-life case studies using social media data
5. Plan and execute a small-scale network analysis project.

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Open Elective IT 703 (D) Digital Image Processing

Course Objective:
The objective of this course is to describe and explain basic principles of digital image processing.

Unit I Introduction and Digital Image Fundamentals: The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Unit II Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Unit III Image Enhancement in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.
Image Restoration A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invariant Degradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

Unit IV Image Compression: Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. **Image Segmentation** Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.

Unit V Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. **Object Recognition** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

References:
1. R.C Gonzalez & Richard E Wood, “Digital Image Processing”, Addison Wesley Publishing
2. Anil K Jain, “Fundamentals of Digital image processing”. PHI.
3. Sonka, Hlavac, Boyle, “Digital image processing and computer vision”, Cengage learning, India Edition.
4. B Chanda, D. Dutta Majumder, “Digital image Processing and Analysis”, PHI.

Course Outcomes:
After the completion of this course, the students will be able to:
1. Explain basic concepts of image processing.
2. Have knowledge of techniques employed for the enhancement of images
3. Categorize image compression techniques
4. Interpret image segmentation and representation techniques.
5. Develop any image processing application

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII- semester

IT 704 Cloud Computing Lab

Course Objective:

The objective of this course is to make students understand *Cloud computing* concepts and the installation of different cloud simulation tools/ cloud setup tools.

Suggested List of Practicals:

1. Study of cloud computing concepts
2. Using Eucalyptus or Open Nebula or equivalent to set up the cloud
3. Find procedure to run the virtual machine of different configuration.
4. Check how many virtual machines can be utilized at particular time.
5. Install a C compiler in the virtual machine and execute a sample program.
6. Show the virtual machine migration based on the certain condition from one node to the other.
7. To develop web applications in cloud
8. To learn the design and development process involved in creating a cloud based application
9. To learn to implement and use parallel programming using Hadoop
10. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows 7 or 8.
11. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
12. Install Google App Engine. Create hello world app and other simple web applications using python/java.
13. Use GAE launcher to launch the web applications.
14. Simulate a cloud scenario using CloudSim.
15. Implementation of various scheduling mechanisms using open source cloud simulator.
16. Find a procedure to transfer the files from one virtual machine to another virtual machine.
17. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
18. Install Hadoop single node cluster and run simple applications like wordcount

Course Outcomes:

On completion of this course, the students will be able to:

1. Configure various virtualization tools such as Virtual Box, VMware workstation.
2. Design and deploy a web application in a PaaS environment.
3. Learn how to simulate a cloud environment to implement new schedulers.
4. Install and use a generic cloud environment that can be used as a private cloud.
5. Manipulate large data sets in a parallel environment.

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New Scheme Based On AICTE Flexible Curricula

Information Technology, VII- semester

IT 705 IoT Lab

Course Objective:
The objective of this course is to to create a competitive industry required IoT skill in students.

Suggested List of Practicals
1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
10. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
11. To install MySQL database on Raspberry Pi and perform basic SQL queries.
12. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
13. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
14. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
15. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

Course Outcomes:
On completion of this course, the students will be able to:

1. Have understanding of Arduino/Raspberry Pi
2. Apply the skills learned by designing, building, and testing a microcontroller-based embedded system
3. Publishing/Subscribing to connect, collect data, monitor and manage assets
4. Remotely monitor data and control devices
5. Perform experiments and mini projects on IoT