SEMMETER III – ELECTIVES

140CP9119 BIG DATA AND ANALYTICS L T P C M
3 0 2 4 100

AIM:
This course aims to introduce to the Big Data paradigm, the various analytics approaches, and the related methods and tools.

OBJECTIVES:
At the end of the course, the students should be able to:
- Define Big Data, identify its application in analytics, and justify the use of Big Data for use cases from selected business domains
- Describe the design and related concepts of Hadoop / HDFS
- Perform MapReduce jobs on Hadoop/HDFS
- Use Hadoop-based tools such as Pig, Hive, HBase, Zookeeper, Sqoop, Flume, Avro for data analytics
- Evaluate various analytics platforms and tools such as Mahout, BigQuery, Berkeley Data Analytics Stack, and R

UNIT I INTRODUCTION 8

UNIT II HADOOP AND HDFS 9

UNIT III MAPREDUCE & YARN 10
MapReduce: Analysis with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes - Classic vs YARN MapReduce: Anatomy of Job Run, Failures, Scheduling, Shuffle and Sort, Task Execution - Types and Formats, Features, Apache MRUnit.

UNIT IV HADOOP-BASED TOOLS 10

UNIT V DATA ANALYTICS 8

L: 45, P: 30, Total: 75
REFERENCES:
AIM:
This course aims to introduce the concepts related to detection and control of Cyber Crime.

OBJECTIVES:
At the end of the course, the students should be able to:
- Understand about Information Security aspects and Cyber Offences
- Describe various aspects pertaining to Cyber crime
- Gain awareness about Indian Cyber law
- Comprehend about Computer Forensic mechanisms
- Understand the importance of Cyber Security and best practices to be adopted

UNIT I  INTRODUCTION  8+3

UNIT II  CYBER CRIME ISSUES  10+3

UNIT III  CYBER LAW  7+3

UNIT IV  FORENSICS  10+3

UNIT V  CYBER SECURITY IMPLICATIONS  10+3

REFERENCES:
AIM
The course aims to introduce the various aspects of Text and Multimedia Information Retrieval

OBJECTIVES
At the end of the course, the students should be able to:
- Understand the principles of various Information Retrieval models
- Design query processing systems with relevance feedback mechanisms
- Apply text processing operations, construct text indices and design effective user interfaces
- Develop systems for searching and retrieving multimedia data
- Design prototype Search Engines

UNIT I  INTRODUCTION

UNIT II  QUERYING
Languages – Key word based Querying – Pattern Matching – Structural Queries – Query Operations – User Relevance Feedback – Local and Global Analysis – Text and Multimedia languages

UNIT III  TEXT OPERATIONS AND USER INTERFACE

UNIT IV  MULTIMEDIA INFORMATION RETRIEVAL

UNIT V  APPLICATIONS
Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Meta-searchers – Parallel Information Retrieval – Distributed Information Retrieval

L: 45, P: 30, Total: 75

REFERENCES:
AIM:
This course aims to impart knowledge on various aspects of Information Visualization and focuses on guidelines for developing clear and effective presentation of Information.

OBJECTIVES:
At the end of the course, the students should be able to:
- Understand the foundations of Data Visualization and its models.
- Comprehend the concepts of Patterns, Visual Objects and Space perception
- Explore various techniques for Interacting with Visualizations
- Design interactive visualizations
- Develop data driven documents

UNIT I FOUNDATIONS OF DATA VISUALIZATION AND VISUAL INFORMATION 12
A Model of Perceptual processing, Types of Data; Luminance, Brightness, lightness and Gamma; Color; Standards, Appearance and Applications in Visualization; Visual Attention and Information: Visual field, Iconic Buffer, Gabor Model, Texture in Visualization, glyphs and Multivariate Discrete data.

UNIT II PATTERNS AND OBJECTS 9
Static and Moving Patterns: Gestalt laws, Contours, Patterns in Motion; Visual Objects and Data Objects: Image-Based Object recognition, Structure-based Object Recognition, Geon diagram, Perceiving the Surface shapes of Objects; Space Perception and Display of data: Depth Cue Theory, Task Based Space Perception.

UNIT III INTERACTING WITH VISUALIZATIONS 6
Interacting with Visualizations: Data Selection and Manipulation loop, Exploration and Navigation loop; Memory systems, Eye movements, Problem Solving with Visualizations.

UNIT IV CODING & ALGORITHMS IN VISUALIZATION SYSTEMS 9

UNIT V DATA DRIVEN DOCUMENTS AND CASE STUDIES 9
D3 Technology Fundamentals: DOM, CSS, JavaScript; Data: Binding data; Drawing with data; Scales, Interactivity; Case Studies: Patient Record Analysis – Business visualization analysis - Child studies – Cross Cultural studies.

L: 45, P: 30, Total: 75

REFERENCES:

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BOS CHAIRMAN
AIM:
This course aims to impart knowledge on the theory and techniques associated with Machine Learning.

OBJECTIVES:
At the end of the course, the students should be able to:
- Comprehend the working of Supervised learning systems
- Apply Bayesian Classification principles and parametric estimation techniques
- Design Clustering algorithms and non-parametric classification & regression systems
- Construct Neural Network and Support Vector Machine Classifiers
- Evaluate the performance of classifiers and combine multiple learners

UNIT I  SUPERVISED LEARNING

UNIT II  PROBABILISTIC LEARNING AND PARAMETRIC METHODS

UNIT III  CLUSTERING AND NON-PARAMETRIC METHODS

UNIT IV  MULTILAYER PERCEPTRONS AND KERNEL MACHINES

UNIT V  CLASSIFICATION ASSESSMENT AND MULTIPLE LEARNERS

L: 45, P: 30, Total: 75

REFERENCES:
AIM:
The course aims to provide foundation knowledge about social networks along with various models and algorithms suitable for mining real world social networks. This course also aims in providing research directions in mining social networks.

OBJECTIVES:
At the end of the course, the students should be able to:
- Analyze the statistical properties of social networks and its data sets
- Gain expertise in various modelling techniques along with link prediction methods
- Visualize the social data and categorize mining methods suitable for real time applications.
- Explore multimedia networks, tagging and privacy preservation mechanisms in social mining.
- Mine various real world social web applications.

UNIT I  PROPERTIES OF SOCIAL NETWORKS

UNIT II  MODELS AND ALGORITHMS
Evolution in social networks – Incremental mining for community tracing – Social influence analysis – Expert location in social networks – Link prediction – Bayesian probabilistic models – Probabilistic relational models – Linear algebraic methods

UNIT III  MINING AND VISUALIZATION

UNIT IV  TAGGING AND PRIVACY
Multimedia Information Networks - Links from Semantics and Community media - Network of Personal Photo Albums and Geographical Information - Inference Methods – Social tagging: Generation models and System design – Visualization, recommendations and applications – Tagging problems - Privacy in social networks – privacy breaches and preservation mechanisms.

UNIT V  APPLICATIONS

REFERENCES:
AIM:
To provide a conceptual understanding of various Soft Computing techniques such as Genetic Algorithms, Neural Networks, Fuzzy Systems and Neuro-Fuzzy hybrid systems.

OBJECTIVES:
At the end of the course, the students should be able to:
- Understand the concept of Soft Computing
- Apply Genetic Algorithms for solving optimization problems
- Develop Neural Network architectures for solving problems
- Apply Fuzzy Logic for Inference, Decision making and Expert system
- Design hybrid Neuro-Fuzzy systems

UNIT I INTRODUCTION TO SOFT COMPUTING

UNIT II GENETIC ALGORITHMS
Introduction – Biological Background – Operators and Techniques in GA – Classification of GA – Applications.

UNIT III NEURAL NETWORKS

UNIT IV FUZZY LOGIC

UNIT V NEURO-FUZZY MODELING

REFERENCE BOOKS:
Aim:
To introduce software project management techniques to successfully initiate, evaluate, plan, manage and control Information Technology projects.

OBJECTIVES:
The students will be able to:
- Plan a newly proposed project using different techniques.
- Evaluate a proposed project.
- Prepare a realistic estimation of a proposed project.
- Elucidate planning of project activities based on effort & duration estimation techniques and effectively manage project risks using different approaches
- Schedule, monitor and control a project successfully.

UNIT I  PROJECT EVALUATION AND MANAGEMENT  9+3

UNIT II  PROJECT PLANNING AND SELECTION OF APPROACHES  9+3

UNIT III  SOFTWARE EFFORT ESTIMATION  8+3

UNIT IV  ACTIVITY PLANNING AND RISK MANAGEMENT  10+3

UNIT V  RESOURCE ALLOCATION, MONITORING AND CONTROL  9+3

Case Study: PRINCE2 – Project Management tools

References:
AIM:
The course aims to provide technology fundamentals of wireless network security along with designing, installation and deployment issues in wireless networks. This course also aims in providing research directions in security aspects of wireless networks.

OBJECTIVES:
At the end of the course, the students should be able to:
- Characterize the security features of various wireless technologies
- Analyze various issues in designing security for wireless LAN & WAN
- Plan, install and deploy security mechanisms and evaluate its performance
- Gain expertise in management of wireless security and its countermeasures
- Provide security solutions for real world scenarios.

UNIT I  TECHNOLOGY FUNDAMENTALS  9 +3

UNIT II  DESIGNING WIRELESS SECURITY  8 +3

UNIT III  PLANNING, INSTALLATION AND DEPLOYMENT  9 +3

UNIT IV  MAINTENANCE AND COUNTERMEASURES  12 +3

UNIT V  ENHANCING SECURITY  7 +3

REFERENCES: