RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

CS601 Machine Learning

COURSE OUTCOMES:

After Completing the course student should be able to:

1. Apply knowledge of computing and mathematics to machine learning problems, models and algorithms;

2. Analyze a problem and identify the computing requirements appropriate for its solution;

3. Design, implement, and evaluate an algorithm to meet desired needs; and

4. Apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.

COURSE CONTENTS:

THEOTY:

Unit –I
Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.

Unit –II
Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, backpropagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters,

Unit –III
Convolutional neural network, flattening, subsampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.
Unit –IV
Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL-framework, MDP, Bellman equations, Value Iteration and Policy Iteration, Actor-critic model, Q-learning, SARSA

Unit –V
Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: ImageNet Competition

TEXT BOOKS RECOMMENDED:


REFERENCE BOOKS:


PRACTICAL:

Different problems to be framed to enable students to understand the concept learnt and get hands-on on various tools and software related to the subject. Such assignments are to be framed for ten to twelve lab sessions.
Course Outcomes: After completion of the course students will be able to

1. Characterize and appreciate computer networks from the viewpoint of components and from the viewpoint of services.
2. Display good understanding of the flow of a protocol in general and a network protocol in particular.
3. Model a problem or situation in terms of layering concept and map it to the TCP/IP stack.
4. Select the most suitable Application Layer protocol (such as HTTP, FTP, SMTP, DNS, Bit torrent) as per the requirements of the network application and work with available tools to demonstrate the working of these protocols.
5. Design a Reliable Data Transfer Protocol and incrementally develop solutions for the requirements of Transport Layer.
6. Describe the essential principles of Network Layers and use IP addressing to create subnets for any specific requirements.

Unit – I

Unit-II

Unit-III

Unit-IV
Unit-V

References:

List of Experiments:
1. Study of Different Type of LAN & Network Equipments.
2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc.
3. LAN installations and Configurations.
4. Write a program to implement various types of error correcting techniques.
5. Write a program to Implement various types of framing methods.
7. Study and Installation of Standard Network Simulator: N.S-2, N.S3,OpNet,QualNet etc .
8. Study & Installation of ONE (Opportunistic Network Environment) Simulator for High Mobility Networks .
9. Configure 802.11 WLAN.
10. Implement & Simulate various types of routing algorithm.
12. Study of Application layer protocols-DNS, HTTP, HTTPS, FTP and TelNet.
Course Outcomes: After completion of the course students will be able to
1. Discuss the classes of computers, and new trends and developments in computer architecture
2. Study advanced performance enhancement techniques such as pipelines, dynamic scheduling, branch predictions, caches
3. Compare and contrast the modern computer architectures such as RISC, Scalar, and multi CPU systems
4. Critically evaluate the performance of different CPU architectures
5. Improve the performance of applications running on different CPU architectures.
6. Develop applications for high performance computing systems

Unit-I
Flynn’s Classification, System Attributes to Performance, Parallel computer models - Multiprocessors and multicomputers, Multivector and SIMD Computers. Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, data flow and Demand driven mechanisms. Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks

Unit-II

Unit-III
Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling -score boarding and Tomosulo’s algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscalar pipeline design, Super pipeline processor design.

Unit-IV
Unit-V
Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model, Functional and Logic Models, Parallel Languages and Compilers, Language Features for Parallelism, Parallel Programming Environment, Software Tools and Environments.

Suggested Books:
1. Kai Hwang, “Advanced computer architecture”, TMH.
2. J.P.Hayes, “computer Architecture and organization”; MGH.
6. Hwang and Briggs, “Computer Architecture and Parallel Processing”; MGH.
Unit-I Introduction to Raster Scan displays, Pixels, Frame buffer, Vector & Character generation, Random Scan systems, Display devices, Scan Conversion techniques, Line Drawing algorithms: simple DDA, Bresenham’s Algorithm, Circle Drawing Algorithms: Midpoint Circle drawing and Bresenham’s Algorithm, Polygon fill algorithm: Boundary-fill and Flood-fill algorithms.


Unit-IV Visualization: Visualization of 2D/3D scalar fields: color mapping, ISO surfaces. Direct volume data rendering: ray-casting, transfer functions, segmentation. Visualization of Vector fields and flow data, Time-varying data, High-dimensional data: dimension reduction, parallel coordinates, Non-spatial data: multi-variate, tree/graph structured, text Perceptual and cognitive foundations, Evaluation of visualization methods, Applications of visualization, Basic Animation Techniques like traditional, key framing

**Recommended Text:**


8. Khalid Sayood , “Introduction to Data Compression”, Morgan Kaufmann
Unit-I Introduction to compiling & Lexical Analysis

Unit-II Syntax Analysis & Syntax Directed Translation
Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR, LALR, LR), Parser generation. Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attribute definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

Unit-III Type Checking & Run Time Environment

Unit –IV Code Generation
Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

Unit –V Code Optimization
Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations , Data flow analysis of structure flow graph Symbolic debugging of optimized code.

References:
5. Mak, writing compiler & Interpreters, Willey Pub.
OBJECTIVES: The student should be made to:

- Learn the Evolution of Knowledge management.
- Be familiar with tools.
- Be exposed to Applications.
- Be familiar with some case studies.

UNIT I: INTRODUCTION

Introduction: An Introduction to Knowledge Management – The foundations of knowledge management - including cultural issues - technology applications organizational concepts and processes - management aspects - and decision support systems. The Evolution of Knowledge management: From Information Management to Knowledge Management – Key Challenges Facing the Evolution of Knowledge Management – Ethics for Knowledge Management.

UNIT II: CREATING THE CULTURE OF LEARNING AND KNOWLEDGE SHARING


UNIT III: KNOWLEDGE MANAGEMENT-THE TOOLS


UNIT IV: KNOWLEDGE MANAGEMENT-APPLICATION

Components of a Knowledge Strategy – Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries).
UNIT V: FUTURE TRENDS AND CASE STUDIES

Advanced topics and case studies in knowledge management – Development of a knowledge management map/plan that is integrated with an organization’s strategic and business plan – A case study on Corporate Memories for supporting various aspects in the process life-cycles of an organization.

TEXT BOOK:


REFERENCE:

Course Learning Objectives:
Understand the different activities in software project development i.e, planning, design and management.

Course content:

2. Software Management Process
   Framework,: Life cycle phases- inception, elaboration, construction and training phase. Artifacts of the process- the artifact sets, management artifacts, engineering artifacts, pragmatics artifacts. Model based software architectures. Workflows of the process. Checkpoints of the process.

3. Software Management Disciplines

Books
2. Project management 2/e ,Maylor.
Course Outcomes:

1. Understanding the evolution and improvement of software economics according to the basic parameters and transition to the modern software management.

2. Learning the objectives, activities and evaluation criteria of the various phases of the life cycle of software management process.

3. Gaining knowledge about the various artifacts, workflows and checkpoints of the software management process and exploring the design concept using model based architecture from technical and management perspective.

4. Develop an understanding of project planning, organization, responsibilities, automation and control of the processes to achieve the desirable results.
Unit – I: Rural Management –

Unit – II: Human Resource Management for rural India

Unit-III Management of Rural Financing:

Unit – IV: Research Methodology:
Concept of Social Research, Traditional Research, Action Research and Participatory Research B: Qualitative Data Construction and Methods of Data Collection C: Techniques of Interview D: Qualitative methods: Sociometry, Case Studies, observation, coding and content analysis

Unit – V: Research Methodology
Collection, Tabulation and Presentation of data B: Measures of Central Tendency, Dispersion, Moments, Skewness and Kurtosis, Correlation and Regression: Sampling Theory and Test of Significance
Course Outcomes: After completion of the course students should be able to
1. Understand the basic of data analytics using concepts of statistics and probability.
2. Understand the needs of data processing techniques.
3. Implement the data analytics techniques using R, MATLAB and Python.
4. Apply the data analytics techniques in real life applications.

Unit-I

Unit-II
Introduction to R as a data analytics tool.

Unit -III
Introduction to MATLAB as a data analytics tool.

Unit -IV
Introduction to python as a data analytics tool.

Unit – V
Case studies.
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Computer Science and Engineering, VI-Semester

CS606 Skill Development Lab

The primary objective of skill development lab is to impart the set of skills into students, so that they are industry ready.

Course Outcomes: After completion of the course students should be able to
1. Understand the basics of software as a product.
2. Understand the current requirements of industries.
3. Implement the software as a product using different design patterns.
4. Apply the software development techniques in real life applications.

Unit – I

Software product life cycle.

Unit – II

Software product development standards.

Unit – III

Design patterns – I

Unit -IV

Design Patterns – II

Unit – V

Case Study