



Department of Computer Science & Engineering and Information Technology

ALGORITHMS DESIGN TECHNIQUES AND ANALYSIS
620211/630211

UNIT I

Introduction: Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Recursive and Non-recursive Algorithms, Empirical Analysis of Algorithms. Brute Force and Exhaustive Search- Sequential Search and Brute-Force String Matching, Closest-Pair and Convex-Hull Problems.

UNIT II

Decrease-and-Conquer: Topological Sorting, Fake-Coin Problem, Russian Peasant Multiplication, Josephus Problem, Computing a Median and the Selection Problem, Game of Nim. **Transform-and-Conquer:** 2-3 Trees, Horner's Rule and Binary Exponentiation, Computing the Least Common Multiple, Counting Paths in a Graph.

UNIT III

Space and Time Trade-Offs: Sorting by Counting, Input Enhancement in String Matching, Boyer-Moore Algorithm, Open Hashing (Separate Chaining), Closed Hashing (Open Addressing), B-Trees

UNIT IV

Iterative Improvement: Simplex Method, Maximum-Flow Problem, Maximum Matching in Bipartite Graphs, Stable Marriage Problem. **Limitations of Algorithm Power:** Lower-Bound Arguments, Trivial Lower Bounds, Information-Theoretic Arguments, Adversary Arguments, Problem Reduction, Decision Trees, Decision Trees for Sorting, Decision Trees for Searching a Sorted Array.

UNIT V

Introduction to P, NP, NP-Hard and NP-Complete, P and NP Problems - Partition problem, Bin-packing problem, NP-Complete Problems.

Recommended Books:

1. Introduction to Design and Analysis of Computer Algorithms, 3rd Edition, Anany Levitin, Pearson Education
 2. Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
 3. Introduction to Algorithms, Cormen Thomas, Leiserson CE, Rivest RL, PHI.
 4. Design & Analysis of Computer Algorithms, Ullmann, Pearson.
 5. Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India.
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COURSE OUTCOMES

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

CO1: outline the basics of algorithms and data structures.

CO2: interpret mathematical foundation in analysis of algorithms.



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- CO3: describe the working of different algorithmic design techniques.
 - CO4: compare the various algorithm design techniques.
 - CO5: select appropriate algorithm design techniques for solving problems.
 - CO6: design algorithms to solve real world engineering problems.
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Department of Computer Science & Engineering and Information Technology

ADVANCED TOPICS IN DATA MINING & WAREHOUSING
620212/630212/640212

UNIT I

Introduction- Motivation, Importance, Functionalities, Basic DM (Data Mining) Vs KDD, DM Applications, Data Warehousing. Evolution of Data Warehousing, Data Warehousing Concepts. Benefits of Data Warehousing, Comparison of OLTP and Data Warehousing, Data Warehousing, Data Warehousing Architecture, Distributed Data Warehouse, Problems of Data Warehousing.

UNIT II

Data Pre-Processing: Data Cleaning, Missing Values, Noisy Data, Data Cleaning, Data Integration and Transformation, Data Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT III

Mining Frequent Patterns, Association, Correlation: Basic Concepts, Efficient Frequent Itemset Mining Method- Apriori Algorithm, Its Variants & other Algorithm for finding Frequent Itemsets using Candidate Generation, Generating Association Rules from Frequent Itemsets, Representative Rules, Improving the Efficiency of Apriori & other Algorithms, Mining Frequent Itemsets without Candidate Generation, Mining Frequent Itemsets using Vertical Data Layout, Maximal Frequent Item Set Mining. Issue Related to the Design of Efficient & Flexible Algorithms.

UNIT IV

Mining Various Kinds of Association Rules, Constraint-Based Association Mining. Classification and Prediction, Cluster Analysis, Graph Mining, Social Network Analysis, Knowledge Discovery through Statistical Techniques, and Knowledge Discovery through Neural Networks, Fuzzy Technology & Genetic Algorithms.

UNIT V

Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining, and Temporal Mining. Social Impacts of Data Mining, Data Mining System Products and Associated Design issues, future trends in Data Mining, Emerging Scenario of Pattern Warehousing System, Case Study –WEKA, SPSS.

Recommended books:

1. Jiwei han and micheline kamber, "data mining: concept and techniques ", harcourt india private limited, 2001.
 2. Margaret h. Dunham, "data mining: introductory and Advanced topic" pearson education, 2003.
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COURSE OUTCOMES



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

- CO1: explain the concepts of data warehousing and data mining.
 - CO2: translate the data needed for data mining using pre- processing techniques.
 - CO3: apply appropriate data mining methods like classification, clustering or frequent pattern mining on large data sets.
 - CO4: analyse advanced data mining topics like Web Mining, Spatial and Temporal Mining.
 - CO5: measure the performance of various data mining algorithms.
 - CO6: test real data sets using popular data mining tools such as WEKA, SPSS.
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Department of Computer Science & Engineering and Information Technology

IMAGE PROCESSING AND RETRIEVAL TECHNIQUES
620213/630213

UNIT I

Introduction to Image Processing Systems, Digital Image Fundamentals: - Image model, Relationship between Pixels, Imaging Geometry, Camera Model, Introduction to FT, DFT and FFT, Walsh Transformation, Hadamard Transformation, Histogram.

UNIT II

Image Preprocessing, Images Transformations, Brightness Transformation, Geometric Transformations, Image Smoothing, Neighborhood Averaging, Median Filtering, Low Pass Filters, Average of Multiple Images, Image Sharpening by Differentiation Technique, High Pass Filtering.

UNIT III

Image Restoration:- Degradation Models for Continuous Function, Effect of Diagonalization, on-Degradation, Algebraic approach to Restoration, Interactive Restoration, Gray Level Interpolation, Inverse & Wiener Filter, FIR Wiener Filter, Filtering using Image Transforms.

UNIT IV

Image Encoding, Mapping, Quantizer and Coder. Image Segmentation, Detection of Discontinuation, Point Detection, Line Detection, Edge Detection, Boundary Extraction, Region Representation.

UNIT V

Object Recognition, Pattern Recognition, Knowledge Representation, Statistical Pattern Recognition, Classification Principles, Classifier Learning, Neural Nets, Syntactic Pattern Recognition, Recognition as Graph Matching, Optimization Techniques in Recognition.

Recommended Books:

1. "Digital Image Processing" by Gonzalez & Wood.
2. "Digital Image Processing" by A. K. Jain.

COURSE OUTCOMES

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

- CO1: recall the fundamental concepts of a digital image processing system.
 - CO2: categorize various compression techniques.
 - CO3: compare various compression techniques.
 - CO4: evaluate the techniques for image enhancement and image restoration.
 - CO5: interpret image segmentation and representation techniques.
 - CO6: elaborate image segmentation and representation techniques.
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