Paper I:Research Advances in Computer Science& Engineering and Research Methodology

(Common to Computer Science and Engineering Streams)

UNIT I

Introduction: Definition and objectives of Research – Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research question-Choice of a problem Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research – APA Ethics code. Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing, Plagiarism.

UNIT II

Quantitative Methods for problem solving: Statistical Modeling and Analysis, Probability Distributions, Inequalities, Fundamentals of Statistical Analysis and Inference, Multivariate methods, Hypothesis Testing. Concepts of Correlation and Regression, Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis. Linear Equations, Order of Operations, Absolute Value Functions, Polynomials and Quadratic Equations.

UNIT III

Tabular and graphical description of data: Tables and graphs of frequency data of one variable, Tables and graphs that show the relationship between two variables, Relation between frequency distributions and other graphs, preparing data for analysis, Use of statistical software R in research.

UNIT IV

Computer Science Concepts:

Boolean algebra, Number Systems, Instruction Formats, Addressing Modes, Computer Arithmetic, I-O Interface, Memory Organization: Cache, Main Memory and Secondary Storage, Process Scheduling Concepts and Algorithms, Critical Section Problem and Semsphores, Virtual Memory Management, Network-Introduction to OSI and TCP/IP Reference Model, Network Security-Public-key cryptography and Message Authentication, SHA-1, Secure Hash Function.

UNIT V

Algorithms and Programming Concepts:

Searching, Sorting, Hashing, Asymptotic Worst Case Time and Space Complexity, Algorithm Design Techniques: Greedy, Dynamic Programming and Divide-and-Conquer, Graph Search, Minimum Spanning Trees, Shortest Paths.

Introduction to Functions and Pointers in C-Programming Language, Features of object oriented programming in Java Programming Language, Data Base-Normalization for Relational Database

Text Books

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan,2006
2. Donald H.McBurney, Research Methods, 5th Edition, Thomson Learning,ISBN:81-315-0047-0,2006.
3. Dr Bharti Motwani, Data Analytics with R , Wiley Publicatios
4. Computer System Architecture, Morris Mano, Prentice Hall of India.
5. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne, Seventh Edition, Wiley Publication
6. Computer Networks, Andrews S Tanenbaum, Edition 5, PHI, ISBN: -81-203-1165-5
7. Cryptography and Network security, Atul Kahate, Tata McGraw-Hill Pub company Ltd., New Delhi
8. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 2003
9. C The Complete Reference, Fourth Edition, Herbert Schildt, Mc Graw Hill.
10. Java: The Complete Reference, Herbert Schildt, Ninth Edition, Oracle Press
11. Fundamentals of Database System , Elmasri, Navathe, Pearson Educaiton.

28/2/24

Adikavi Nannaya University:Rajamahendravaram

Department of Computer Science&Engineering

Pre-Ph.D Examination::2024

Paper I:Research Advances in Computer Science & Engineering and Research Methodology

Time: 3 hrs **Max.Marks:100**

Answer all the questions

Each question carries 20 Marks

1.a) Discuss various steps in research process.

b) Define research and Discuss objectives of research in detail.

(OR)

2.a) Discuss the need of ethics in research.

b) What is the purpose of research. Write about critical evaluation.

3.a) Explain the probability distribution with an example.

b) Discuss multivariate methods.

(OR)

4.a) Write about concepts of correlation and regression.

b) Discuss Applications of spectral analysis.

5. Describe the relation between frequencies distributions and other graphs.

(OR)

6. Discuss about the uses of statistical software R in research.

7.a) Explain the importance of cache memory in computer system.

b) Discuss OSI reference model.

(OR)

8.a) Explain critical section problem and semaphores.

b) Explain in detail about SHA-1.

9.a) Write about Asymptotic notations.

b) Discuss about minimum spanning trees.

(OR)

10.a) Explain features of object oriented programming in java

b) Discuss in detail about Normalization for relational data base.

18/12/24

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Pre - Ph. D EXAMINATION 2024

Paper-II: MACHINE LEARNING AND DEEP LEARNING

K. Suresh - 2202110101.

UNIT-I

Data Pre-Processing: overview of data pre-processing - data pre-processing. Data Cleaning Techniques: Filling missing values - cleaning and filling missing data - drop missing values - smoothing noisy data-Removing inconsistencies.
Data Integration and Data Reduction Techniques: Dimensionality reduction - Numerosity reduction data compression - Histograms - clustering - sampling Data Transformation.

UNIT-II

Machine Learning - Types of Machine Learning Algorithms, Reinforcement Learning. Applications of Machine Learning and Tools in Machine Learning.
Classification and Regression: Naive Bayes Classification - Linear Regression, Logistic Regression, K-Nearest Neighbors (KNN) - Random forest Model - Support Vector Machines.

UNIT-III

Unsupervised Learning: Supervised Vs Unsupervised learning - Introduction to clustering applications of clustering - types of clustering techniques.
Types of Unsupervised learning: Partitioning methods: k-means algorithm - k-medoids algorithm - Hierarchical Method: agglomerative clustering.

UNIT-IV

Convolutional Neural Networks: Introduction to CNNs, Kernel filter, Principles behind CNNs, Multiple Filters, problem and solutions.
VGG16 Model: Introduction to VGG16 Model – Architecture of VGG16neural network architecture. Introduction to Transfer Learning-why do we need Transfer Learning-how does Transfer Learning work.

UNIT-V

Deep Learning Models: Understanding RNN, Advanced use of RNN, Sequence Processing with convents.
Deep Learning Applications: Image segmentation, Object detection, Attention model for computer vision tasks, Natural Language Processing

PRESCRIBED TEXTBOOKS

1. Introduction to Machine Learning, EthemAlpaydin, Second Edition,2010,prentice Hall of India.

2. Deep Learning with Python-Francois chollet - Manning pubrishers.

28/2/24

MODEL QUESTION PAPER

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Pre - Ph. D EXAMINATION 2024

Paper-II: MACHINE LEARNING AND DEEP LEARNING

Time:3 Hour **Max.Marks: 100**

Answer ALL questions

Each Question Carries 20 Marks

1. (a) What are the major tasks in Data Pre processing?
   (b) Explain about Data Cleaning Techniques?
   (OR)
   (c) Explain about the data Reduction Strategies?
   (d) What are the different Data Integration Techniques. Explain?
2. (a) What is Machine Leaming? Explain the different types of machine learning?
   (b) Write about the applications of Machine Learning?
   (OR)
   (c) Briefly discuss about Naive Bayes classifier?
   (d) Write algorithm for KNN?
3. (a) Explain the concept of Clustering?
   (b) Briefly discuss about the different types of Clustering Techniques?
   (OR)
   (c) Briefly discuss about the k-means algorithm?
4. (a)Explain about VGG16 Model Architecture.
   (b) Explain transfer learning model.
   (OR)
   (c) Explain Deep Learning for Natural Language Processing.
   (d) Explain various Deep Learning applications in brief.
5. (a)What are Convolution Neural Networks. Explain?
   (b) Discuss about CNN Algorithm with example?
   (OR)
   (c) Explain about Image segmentation.
   (d) Explain the concept of Recurrent Neural Networks.

SK. MUNNISHA - 2102110101.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Pre-Ph.D. Course Work Syllabus
Paper – II: MACHINE LEARNING WITH PYTHON

UNIT-I

Basics of Python Programming: Basics of Python Programming-Structure of Python Programme – data types – Literals- constants – operators – Input / Output statements.
Control Structures: Selection statements - Iteration statements.
Data Collection Structures: Lists, Tuples, Dictionaries.
OOPs Concepts: Class and objects – Constructors and destructors – Inheritance – Encapsulation and Polymorphism.

UNIT-II

Data Pre-Processing: Overview of data pre-processing - data pre-processing.
Data Cleaning Techniques: Filling missing values – cleaning and filling missing data – drop missing values – smoothing noisy data – Removing inconsistencies.
Data Integration and Data Reduction Techniques: Dimensionality reduction – Numerosity reduction – data compression – Histograms – clustering – sampling Data **Transformation and Data Discretization:** overview of Data Transformation strategies – Discretization by binning - Discretization by Histogram Analysis - Discretization by cluster, Decision tree and correlation analysis.

UNIT-III

Data Analysis: Data Analysis Tools- Business Intelligence, Statistical analysis, SQL Consoles, Data Visualization. **Data Grouping -** What is data grouping, frequency grouping, histogram, advantages of data grouping. Iterating through Graphs, Aggregations, Transformations, Filtration.
Data Visualization: Direct Plotting techniques: Line Plot, Bar Plot, Pie Chart, Box Plot, Histogram Plot, Scatter Plot, **Matplotlib Plot techniques:** Line Plot, Bar Chart, Histogram Plot, Scatter Plot, Stack Plot, Pie Chart.

UNIT-IV

Introduction to Machine Learning: Human Learning – Types of Human Learning: Learning under expert guidance-learning guided by knowledge gained from experts –learning by itself. Machine Learning – Types of Machine Learning: supervised learning –unsupervised learning-Reinforcement Learning. Applications of Machine Learning and Tools in Machine Learning.
Supervised Learning:
Classification and Regression: –Naïve Bayes Classification – Linear Regression, Logistic Regression, k-Nearest Neighbors (KNN) - Decision Tree – Random forest Model – Support Vector Machines.

8/4/24

UNIT-V

Unsupervised Learning: Supervised Vs Unsupervised learning – Introduction to clustering - applications of clustering – types of clustering techniques.

Types of Unsupervised learning: Partitioning methods: k-means algorithm – k-mediods algorithm – Hierarchical Method: agglomerative clustering - Principal Component analysis.

Text Books:

1. Problem Solving and Python Programming, S.A. Kulakarni, 2nd Edition, Yesdee.
2. Data Mining: Concepts and Techniques by Han and Kamber, Second Edition, Morgan Kaufmann Publishers.
3. Data Analysis and Visualization Using Python by Dr. OssamaEmbarak, Apress Publications.
4. Machine Learning by Saikat Dutt, Subramanian Chandra Mouli, Amit Kumar Das, Pearson.

References:

1. Machine Learning by Tom M. Mitchell, McGraw-Hill Publisher.
2. Machine Learning, Anuradha Srinivasaraghavan, VincyJoseph, Kindle Edition, 2020, WILEY.

Online Resources:

https://www.datapine.com/blog/data-analysis-methods-and-techniques/

https://www.shiksha.com/statistics-preparation/grouping-data-3687

28/7/24

SHAIK MUNNISHA
Research Scholar
Full Time Ph.D.(CSE)
Regd. No: 2102110101

Prof. P. SURESH VARMA
Research Supervisor

MODEL QUESTION PAPER

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Pre-Ph.D. EXAMINATION 2024

Paper – II: MACHINE LEARNING WITH PYTHON

Time: 3 Hours Max.Marks: 100

Answer ALL Questions.

Each Question Carries 20 Marks

1. (a). Explain the structure of python program with an example?
   (b). Explain the basic data types available in Python with examples?

   (OR)

   (c). Explain about the list and tuple with examples?
   (d). Briefly discuss about constructors and destructors?

2. (a). What are the major tasks in Data Preprocessing?
   (b). Explain about data cleaning techniques?

   (OR)

   (c). Explain about the data reduction strategies?
   (d). Explain about the Discretization by cluster, decision tree and correlation analysis?
3. (a). Explain about data analysis tools?
   (b). Explain about the frequency grouping and histogram?

   (OR)

   (c). Explain the concept of aggregation, transformation and filtering?
   (d). Discuss about any 5 direct plotting techniques?
4. (a). What is machine learning? Explain the different types of machine learnings?
   (b). Write about the applications of Machine Learning?

   (OR)

   (c). Briefly discuss about naïve bayes classifier?
   (d). Write algorithm for kNN?
5. (a). Explain the concept of clustering?
   (b). Briefly discuss about the different types of clustering?

   (OR)

   (c). Briefly discuss about the k-means algorithm?
   (d). Explain the Principal Component Analysis method?

28/2/24

SHAIK MUNNISHA
Research Scholar
Full Time Ph.D.(CSE)
Regd. No: 2102110101

Prof. P. SURESH VARMA
Research Supervisor