

# PUNE INSTITUTE OF COMPUTER TECHNOLOGY

**DHANKAWADI, PUNE –43**

## LIST OF LAB EXPERIMENTS

**ACADEMIC YEAR: 2023- 2024**

**Department:** Computer Engineering

**Date:** 17/07/2023

**Class:** B.E.

**Semester:** I

**Subject:** Laboratory Practice III (410246)

**Examination scheme:** TW-50, PR-50

LAB EXP. NO	PROBLEM STATEMENT
GROUP A	<b>Based on Design and Analysis of Algorithms (410241)</b> (Assignment numbers from 1 to 5 are mandatory, any 1 mini project from assignment number 6)
1.	Write a program non-recursive and recursive program to calculate Fibonacci numbers and analyze their time and space complexity.
2.	Write a program to implement Huffman Encoding using a greedy strategy.
3.	Write a program to solve a 0-1 Knapsack problem using dynamic programming or branch and bound strategy.
4.	Design n-Queens matrix having first Queen placed. Use backtracking to place remaining Queens to generate the final n-queen
5.	Write a program for analysis of quick sort by using deterministic and randomized variant.
6	<b>Mini-Project on DAA (Any 1 mini project)</b> <b>1. Mini Project</b> - Write a program to implement matrix multiplication. Also implement multithreaded matrix multiplication with either one thread per row or one thread per cell. Analyze and compare their performance.

	<p><b>2. Mini Project</b> - Implement merge sort and multithreaded merge sort. Compare time required by both the algorithms. Also analyze the performance of each algorithm for the best case and the worst case.</p> <p><b>3. Mini Project</b> - Implement the Naive string matching algorithm and Rabin-Karp algorithm for string matching. Observe difference in working of both the algorithms for the same input.</p> <p><b>4. Mini Project</b> - Different exact and approximation algorithms for Travelling-Sales-Person Problem</p>
<b>GROUP B</b>	<p style="text-align: center;"><b>Based on Machine Learning (410242)</b></p> <p style="text-align: center;"><b>(Assignment numbers from 1 to 5 are mandatory, any 1 mini project from assignment number 6)</b></p>
1	<p>Predict the price of the Uber ride from a given pickup point to the agreed drop-off location. Perform following tasks:</p> <ol style="list-style-type: none"> <li>1. Pre-process the dataset.</li> <li>2. Identify outliers.</li> <li>3. Check the correlation.</li> <li>4. Implement linear regression and random forest regression models.</li> </ol> <p>Evaluate the models and compare their respective scores like R<sup>2</sup>, RMSE, etc. Dataset link: <a href="https://www.kaggle.com/datasets/yasserh/uber-fares-dataset">https://www.kaggle.com/datasets/yasserh/uber-fares-dataset</a></p>
2	<p>Classify the email using the binary classification method. Email Spam detection has two states: a) Normal State Not Spam, b) Abnormal State Spam. Use K-Nearest Neighbors and Support Vector Machine for classification. Analyze their performance.</p> <p>Dataset link: The emails.csv dataset on the Kaggle <a href="https://www.kaggle.com/datasets/balaka18/email-spam-classification-dataset-csv">https://www.kaggle.com/datasets/balaka18/email-spam-classification-dataset-csv</a></p>
3	<p>Given a bank customer, build a neural network-based classifier that can determine whether they will leave or not in the next 6 months.</p> <p>Dataset Description: The case study is from an open-source dataset from Kaggle. The dataset contains 10,000 sample points with 14 distinct features such as CustomerId, CreditScore, Geography, Gender, Age, Tenure, Balance, etc.</p> <p>Link to the Kaggle project: <a href="https://www.kaggle.com/barelydedicated/bank-customer-churn-modeling">https://www.kaggle.com/barelydedicated/bank-customer-churn modeling</a></p> <p>Perform following steps:</p> <ol style="list-style-type: none"> <li>1. Read the dataset.</li> <li>2. Distinguish the feature and target set and divide the data set into training and test sets.</li> <li>3. Normalize the train and test data.</li> <li>4. Initialize and build the model. Identify the points of improvement and implement the</li> </ol>

	<p>same.</p> <p>5. Print the accuracy score and confusion matrix (5 points).</p>
4	<p>Implement Gradient Descent Algorithm to find the local minima of a function. For example, find the local minima of the function <math>y=(x+3)^2</math> starting from the point <math>x=2</math></p>
5	<p>Implement K-Means clustering/ hierarchical clustering on sales_data_sample.csv dataset. Determine the number of clusters using the elbow method.</p> <p>Dataset link : <a href="https://www.kaggle.com/datasets/kyanyoga/sample-sales-data">https://www.kaggle.com/datasets/kyanyoga/sample-sales-data</a></p>
6	<p style="text-align: center;"><b>Mini-Project on Machine Learning</b></p> <ol style="list-style-type: none"> <li><b>Mini Project</b> - - Use the following dataset to analyze ups and downs in the market and predict future stock price returns based on Indian Market data from 2000 to 2020. Dataset Link: <a href="https://www.kaggle.com/datasets/sagara9595/stock-data">https://www.kaggle.com/datasets/sagara9595/stock-data</a></li> <li><b>Mini Project</b> - Build a machine learning model that predicts the type of people who survived the Titanic shipwreck using passenger data (i.e. name, age, gender, socio-economic class, etc.). Dataset Link: <a href="https://www.kaggle.com/competitions/titanic/data">https://www.kaggle.com/competitions/titanic/data</a></li> </ol>
<b>GROUP C</b>	<p style="text-align: center;"><b>Based on Blockchain Technology (410243)</b> <b>(Assignment numbers from 1 to 5 are mandatory, any 1 mini project from assignment number 6)</b></p>
1.	Installation of MetaMask and study spending Ether per transaction.
2.	Create your own wallet using Metamask for crypto transactions.
3.	<p>Write a smart contract on a test network, for Bank account of a customer for following operations:</p> <ul style="list-style-type: none"> <li>• Deposit money</li> <li>• Withdraw Money</li> <li>• Show balance</li> </ul>

4.	<p>Write a program in solidity to create Student data. Use the following constructs:</p> <ul style="list-style-type: none"> <li>• Structures</li> <li>• Arrays</li> </ul> <p>Deploy this as smart contract on Ethereum and Observe the transaction fee and Gas values.</p>
5.	Write a survey report on types of Blockchains and its real time use cases.
6	<p style="text-align: center;"><b>Mini-Project on Blockchain Technology</b></p> <ol style="list-style-type: none"> <li><b>1. Mini Project</b> - Develop a Blockchain based application dApp (de-centralized app) for e-voting system.</li> <li><b>2. Mini Project</b> - Develop a Blockchain based application for transparent and genuine charity</li> <li><b>3. Mini Project</b> - Develop a Blockchain based application for health related medical records</li> <li><b>4. Mini Project</b> - Develop a Blockchain based application for mental health</li> </ol>

Subject Coordinator  
(Prof. Arundhati A. Chandorkar)

Head, Department of Computer Engineering  
(Dr. Geetanjali. V. Kale)