PUNE INSTITUTE OF COMPUTER TECHNOLOGY

DHANKAWADI, PUNE –43

LIST OF LAB ASSIGNMENTS

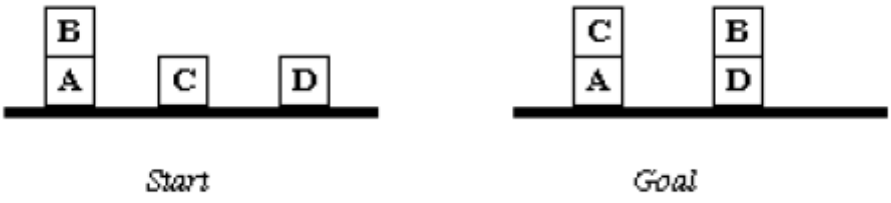
ACADEMIC YEAR: 2019- 2020

Department: Computer Engineering. Date: 03/06/2019
Class: B.E Semester: I
Subject: Laboratory Practice I (410246) Examination scheme: TW-50, PR-50

410241:: High Performance Computing		
Select any four assignments individually and any one mini-project with group of 2-3 students.		
Sr.No.	Assign. No.	**Problem Statement**
1	HPC1	a) Implement Parallel Reduction using Min, Max, Sum and Average operations. b) Write a CUDA program that, given an N-element vector, find- • The maximum element in the vector • The minimum element in the vector • The arithmetic mean of the vector • The standard deviation of the values in the vector Test for input N and generate a randomized vector V of length N (N should be large). The program should generate output as the two computed maximum values as well as the time taken to find each value.
2	HPC2	

		Vector and Matrix Operations- Design parallel algorithm to 1. Add two large vectors 2. Multiply Vector and Matrix 3. Multiply two N × N arrays using n^2 processors
3	HPC3	**Parallel Sorting Algorithms-** For Bubble Sort and Merger Sort, based on existing sequential algorithms, design and implement parallel algorithm utilizing all resources available.
4	HPC4/HPC 5	**Parallel Search Algorithm-** Design and implement parallel algorithm utilizing all resources available. for **Binary Search for Sorted Array** **Depth-First Search (** tree or an undirected graph) **OR** **Breadth-First Search (** tree or an undirected graph) **OR** **Best-First Search that (** traversal of graph to reach a target in the shortest possible path)
5		Parallel Implementation of the K Nearest Neighbors Classifier
Sample Mini Projects		
6		**Compression Module (Image /Video)** Large amount of bandwidth is required for transmission or storage of images. This has driven the research area of image compression to develop parallel algorithms that compress images. **OR** For video: RGB To YUV Transform concurrently on many core GPU
7		**Generic Compression**

<table>
<tr><td></td><td></td><td>Run length encoding concurrently on many core GPU</td></tr>
<tr><td>8</td><td></td><td>Encoding
Huffman encoding concurrently on many core GPU</td></tr>
<tr><td colspan="3">410242: Artificial Intelligence & Robotics</td></tr>
<tr><td colspan="3">Select any four assignments individually and any one mini-project with group of 2-3 students.</td></tr>
<tr><td>1</td><td>AIR1/AIR2 /AIR3/AIR 8</td><td>Implement Tic-Tac-Toe using A* algorithm</td></tr>
<tr><td>2</td><td></td><td>Implement 3 missionaries and 3 cannibals problem depicting appropriate graph. Use A* algorithm.</td></tr>
<tr><td>3</td><td></td><td>Solve 8-puzzle problem using A* algorithm. Assume any initial configuration and define goal configuration clearly.</td></tr>
<tr><td>8</td><td></td><td>Solve following 6-tiles problem stepwise using A* algorithm,
Initial Configuration
<table><tr><td>B</td><td>W</td><td>B</td><td>W</td><td>B</td><td>W</td></tr></table>
Final Configuration
<table><tr><td>B</td><td>B</td><td>B</td><td>W</td><td>W</td><td>W</td></tr></table>
Constraint: Tiles can be shifted left or right 1 or 2 positions with cost 1 and 2 respectively.</td></tr>
<tr><td>4</td><td>AIR4/AIR5 /AIR6/AIR</td><td>Define the operators for controlling domestic robot; use these operators to</td></tr>
</table>

	10	plan an activity to be executed by the robot. For example, transferring two/three objects one over the other from one place to another. Use Means-Ends analysis with all the steps revealed.
5		Implement any one of the following Expert System , Medical Diagnosis of 10 diseases based on adequate symptoms Identifying birds of India based on characteristics
6		Implement alpha-beta pruning graphically with proper example and justify the pruning.
10		Use Heuristic Search Techniques to Implement Hill-Climbing Algorithm.
7	AIR7/AIR9	Develop elementary chatbot for suggesting investment as per the customers need.
9		Implement goal stack planning for the following configurations from the blocks world, 
11	AIR11/AIR 12/AIR13	Use Heuristic Search Techniques to Implement Best first search (Best-Solution but not always optimal) and A* algorithm (Always gives optimal solution).
12		Constraint Satisfaction Problem:

		Implement crypt-arithmetic problem or n-queens or graph coloring problem (Branch and Bound and Backtracking)
13		Implement syntax analysis for the assertive English statements. The stages to be executed are, Sentence segmentation Word tokenization Part-of-speech/morpho syntactic tagging Syntactic parsing (Use any of the parser like Stanford)
410243:: Data Analytics		
Select any four assignments individually and any one mini-project with group of 2-3 students.		
1	DA1	Download the Iris flower dataset or any other dataset into a DataFrame. (eg https://archive.ics.uci.edu/ml/datasets/Iris) Use Python/R and Perform following – How many features are there and what are their types (e.g., numeric, nominal)? Compute and display summary statistics for each feature available in the dataset. (eg. minimum value, maximum value, mean, range, standard deviation, variance and percentiles Data Visualization-Create a histogram for each feature in the dataset to illustrate the feature distributions. Plot each histogram. Create a boxplot for each feature in the dataset. All of the boxplots should be combined into a single plot. Compare distributions and identify outliers.
	DA2	

2		Download Pima Indians Diabetes dataset. Use Naive Bayes‟ Algorithm for classification Load the data from CSV file and split it into training and test datasets. summarize the properties in the training dataset so that we can calculate probabilities and make predictions. Classify samples from a test dataset and a summarized training dataset.
3	DA3/DA5	Write a Hadoop program that counts the number of occurrences of each word in a text file.
5		Use Movies Dataset. Write the map and reduce methods to determine the average ratings of movies. The input consists of a series of lines, each containing a movie number, user number, rating, and a timestamp: The map should emit movie number and list of rating, and reduce should return for each movie number a list of average rating.
4		Write a program that interacts with the weather database. Find the day and the station with the maximum snowfall in 2013
6	DA4/DA6/ DA7/DA8/ DA9	Trip History Analysis: Use trip history dataset that is from a bike sharing service in the United States. The data is provided quarter-wise from 2010 (Q4) onwards. Each file has 7 columns. Predict the class of user. Sample Test data set available here https://www.capitalbikeshare.com/trip-history-data
7		Bigmart Sales Analysis: For data comprising of transaction records of a sales store. The data has 8523 rows of 12 variables. **Predict the sales of a store.** Sample Test data set available here https://datahack.analyticsvidhya.com/contest/practice-problem-big-mart-sales-iii/
8		Twitter Data Analysis: **Use** Twitter data for sentiment analysis. The dataset is 3MB in size and has 31,962 tweets. **Identify the tweets which are hate**

		tweets and which are not. Sample Test data set available here https://datahack.analyticsvidhya.com/contest/practice-problem-twitter-sentiment-analysis/
9		Time Series Analysis: Use time series and forecast traffic on a mode of transportation. Sample Test data set available here https://datahack.analyticsvidhya.com/contest/practice-problem-time-series-2/

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