

Computer Programming Laboratory

B.Tech. II Semester



**Department: Computer Science and
Engineering**

**Faculty of Engineering & Technology
Ramaiah University of Applied Sciences**

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Ramaiah University of Applied Sciences

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Faculty	Engineering & Technology
Programme	B. Tech. in Computer Science and Engineering
Year/Semester	7 th Semester
Name of the Laboratory	Computational Intelligence Laboratory
Laboratory Code	CSC401A

List of Experiments

1. Lists and tuples manipulation in python
2. File Operations and reading CSV files using python
3. Python based programs on Statistics and Clustering
4. Python based Linear Regression Logistic Regression Decision Tree Algorithms
5. Python based SVM, Naive Bayes, KNN Algorithms
6. K-Means and Random Forest Algorithms
7. BFS and DFS algorithm
8. Classifying Handwritten Digits with TF.Learn - Machine Learning
9. Pipe lining Algorithms
10. Program to compare different machine learning algorithm

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Laboratory 1

Title of the Laboratory Exercise: **Introduction to Python programming**

1. Introduction and Purpose of Experiment

In this laboratory exercises students get familiar with the IDE to edit, compile and run Python programs using a set of simple exercises.

2. Aim and Objectives

Aim

- To use Anaconda and develop Python programs

Objectives

At the end of this lab, the student will be able to

- Explain the features and use of Anaconda IDE to develop C programs
- Edit, compile and execute C programs successfully using Netbeans IDE

3. Experimental Procedure

1. Write a program to do various operations using list.
2. Write a program to do various operations using tuples
3. Program should be edited, compiled and executed using Anaconda IDE.

4. Calculations/Computations/Algorithms

5. Presentation of Results

6. Analysis and Discussions

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7. Conclusions

8. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations

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Laboratory 2

Title of the Laboratory Exercise: File operations and reading files with Comma Separated File csv extension using Python

Introduction and Purpose of Experiment

File operation is an important aspect of computing.

1. Aim and Objectives

Aim

- To develop programs to handles file and file operations
- The CSV module includes all the necessary functions built in. They are:
- csv.reader
- csv.writer
-

Objectives

At the end of this lab, the student will be able to

- Read, write and manipulate files.
- Extract data from files with csv extension

2. Experimental Procedure

- i. Analyse the problem statement
- ii. Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- iii. Implement the algorithm in C language
- iv. Compile the C program
- v. Test the implemented program
- vi. Document the Results
- vii. Analyse and discuss the outcomes of your experiment

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3. Questions

1) Write a Python program having following options

- a. Read
- b. Write
- c. Manipulate data in the file.
- d.

2) Write a Python program to Read file with CSV extension and display the data.

4. Calculations/Computations/Algorithms

5. Presentation of Results

6. Analysis and Discussions

7. Conclusions

8. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations

Laboratory 3

Title of the Laboratory Exercise: Statistical operations and Clustering

Introduction and Purpose of Experiment

Python provides libraries to do statistical operations and learn the concept of clustering algorithms

1. Mean, standard deviation and variance can be computed.
2. Concept of clustering

By solving the problems students will be able to

Compute mean, standard deviation and variance for the given data set

Identify different patterns in the given data set using clustering algorithm

1. Aim and Objectives

Aim

To develop programs to carry out statistical operation on the given data.

Apply clustering algorithm for a given set of data identify different pattern and predict which cluster a new data belongs to.

At the end of this lab, the student will be able to

- Apply statistical operations
- Apply clustering algorithms

2. Experimental Procedure

- i. Analyse the problem statement
- ii. Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- iii. Implement the algorithm in C language
- iv. Compile the C program
- v. Test the implemented program
- vi. Document the Results

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vii. Analyse and discuss the outcomes of your experiment

3. Questions

- 1) Write a Python program to compute mean, standard deviation and variance for a given data set.
- 2) Write a Python program to apply clustering algorithm to identify different pattern in the given data and predict to which cluster new data belongs to.

4. Calculations/Computations/Algorithms

5. Presentation of Results

6. Analysis and Discussions

7. Conclusions

8. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations

Name: _____

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Laboratory 4

Title of the Laboratory Exercise:

1. Introduction and Purpose of Experiment To learn Various machine learning Algorithms

2. Aim and Objectives

Aim

- To develop programs to do regression and, logistic regression, decision tree on the given data set and compute the result.

Objectives

At the end of this lab, the student will be able to

- a. Apply machine learning algorithms and know the difference between linear and logistic regression
- b. Build a decision tree for a given data set. Predict the outcome for a given data.

3. Experimental Procedure

- i. Analyse the problem statement
- ii. Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- iii. Implement the algorithm in C language
- iv. Compile the C program
- v. Test the implemented program
- vi. Document the Results
- vii. Analyse and discuss the outcomes of your experiment

4. Questions

- 1) Write a python program to read data set and apply
 - a. Linear Regression
 - b. Logistic Regression
- 2) Write a program to build a decision tree for a given data set.
 - a. Predict the possible outcome for a given data set.

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5. Calculations/Computations/Algorithms

6. Presentation of Results

7. Analysis and Discussions

8. Conclusions

9. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations

Name: _____

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Laboratory 5

Title of the Laboratory Exercise: Machine learning Algorithms

1. Introduction and Purpose of Experiment

Is to become familiar with different machine learning algorithms

2. Aim and Objectives

Aim

- To develop programs to implement SVM, Naïve Bayes and KNN algorithm on a given data set.

Objectives

At the end of this lab, the student will be able to

Apply SVM, KNN and Naïve Bayes Algorithm on a given data set.

3. Experimental Procedure

- i. Analyse the problem statement
- ii. Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- iii. Implement the algorithm in C language
- iv. Compile the C program
- v. Test the implemented program
- vi. Document the Results
- vii. Analyse and discuss the outcomes of your experiment

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4. Questions

- 1) Develop a python program to read data from a library and apply SVM algorithm on the data and classify the new data.
- 2) Develop a python program that reads a data set from a library and APPLY KNN algorithm to optimize the number of clusters.
- 3) Develop a python program to read the weather data and apply Bayes algorithm to predict whether it will sunny or raining tomorrow.

5. Calculations/Computations/Algorithms

6. Presentation of Results

7. Analysis and Discussions

8. Conclusions

9. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations

Laboratory 6

Title of the Laboratory Exercise: Apply K-mean and Random forest Algorithm

1. Introduction and Purpose of Experiment

2. Aim and Objectives

Aim

Objectives

At the end of this lab, the student will be able to

Understand and apply K-means algorithm

Understand and apply Random Forest algorithm

3. Experimental Procedure

- i. Analyse the problem statement
- ii. Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- iii. Implement the algorithm in C language
- iv. Compile the C program
- v. Test the implemented program
- vi. Document the Results
- vii. Analyse and discuss the outcomes of your experiment

4. *You are in charge of a reward scheme website, where existing customers log in to spend their points. You want users to spend as many points as they can, so they have high perceived value. You capture a unique userId on login into custom dimension1 and use Google Analytics enhanced e-commerce to track which prizes users view and claim.*

Notice this scenario involves the reliable user ID, since every user is logging in to use the website. This may be tricky to do on your own website, so you may need to only work with a subset of your users. In my view, the data gains you can make from reliable user identification means I try to encourage the design of the website to involve logged in content as much as possible.

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1: Can we predict what prizes a user will claim from their view history Random forest?

2: Can we cluster users based on their view product behavior K-means algorithm?

5. Calculations/Computations/Algorithms

6. Presentation of Results

7. Analysis and Discussions

8. Conclusions

9. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations

Name: _____

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Laboratory 7

Title of the Laboratory Exercise: Handling non-numerical data

Introduction and Purpose of Experiment

1. Aim and Objectives

Aim

- To develop programs for searching BFS and DFS algorithms

Objectives

At the end of this lab, the student will be able to

- Create Python program to search a graph using BFS and DFS algorithm

2. Experimental Procedure

- i. Analyse the problem statement
- ii. Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- iii. Implement the algorithm in C language
- iv. Compile the C program
- v. Test the implemented program
- vi. Document the Results
- vii. Analyse and discuss the outcomes of your experiment

3. Questions

Develop a Python program for a given graph to search using BFS and DFS algorithms

4. Calculations/Computations/Algorithms

5. Presentation of Results

Name: _____

Roll Number: _____

6. Analysis and Discussions

7. Conclusions

8. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations

Laboratory 8

Title of the Laboratory Exercise: **Classifying Handwritten Digits with TF.Learn - Machine Learning**

1. Introduction and Purpose of Experiment

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To become familiar with Tensor flow Library

2. Aim and Objectives

Aim

- To develop programs using Tensor flow algorithm

Objectives

At the end of this lab, the student will be able to

3. Experimental Procedure

- i. Analyse the problem statement
- ii. Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- iii. Implement the algorithm in C language
- iv. Compile the C program
- v. Test the implemented program
- vi. Document the Results
- vii. Analyse and discuss the outcomes of your experiment

4. Questions

- Write a Python program using tensor flow which demonstrates how to use a recurrent neural network to predict the next word in a sentence..

1.

5. Calculations/Computations/Algorithms

6. Presentation of Results

7. Analysis and Discussions

Name: _____

Roll Number: _____

8. Conclusions

9. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations

Name: _____

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Laboratory 9

Title of the Laboratory Exercise: Basic data structures

1. Introduction and Purpose of Experiment

Data structure is a way of collecting and organising data in such a way that we can perform operations on these data in an effective way. By solving these problems students will become familiar with the implementations of Stacks and Queues.

2. Aim and Objectives

Aim

- To develop pipelining of machine learning algorithm
- Standardize the data.
- Learn a Linear Discriminant Analysis model.
- The example below demonstrates the pipeline defined with four steps:
 1. Feature Extraction with Principal Component Analysis (3 features)
 2. Feature Extraction with Statistical Selection (6 features)
 3. Feature Union
 4. Learn a Logistic Regression Model

The pipeline is then evaluated using 10-fold cross validation.

Objectives

At the end of this lab, the student will be able to

The example below demonstrates this important data preparation and model evaluation workflow. The pipeline is defined with two steps:

1. Standardize the data.
2. Learn a Linear Discriminant Analysis model.

The pipeline is then evaluated using 10-fold cross validation.

3. Experimental Procedure

- i. Analyse the problem statement

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- ii. Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- iii. Implement the algorithm in C language
- iv. Compile the C program
- v. Test the implemented program
- vi. Document the Results
- vii. Analyse and discuss the outcomes of your experiment

4. Questions

1) Write a Python program to pipeline machine learning algorithms

5. Calculations/Computations/Algorithms

6. Presentation of Results

7. Analysis and Discussions

8. Conclusions

9. Comments

1. Limitations of Experiments

2. Limitations of Results

Name: _____

Roll Number: _____

3. Learning happened

4. Recommendations

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Laboratory 10

Title of the Laboratory Exercise: Basic data structures

1. Introduction and Purpose of Experiment

This lab demonstrates students to do a comparative analysis of Algorithms which helps in optimization and choosing the best algorithm for a situation.

2. Aim and Objectives

Aim

- To develop programs using array based data structures

Objectives

At the end of this lab, the student will be able to

- To do a comparative study of machine learning algorithm for a given problem
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3. Experimental Procedure

- Analyse the problem statement
- Design an algorithm for the given problem statement and develop a flowchart/pseudo-code
- Implement the algorithm in C language
- Compile the C program
- Test the implemented program
- Document the Results
- Analyse and discuss the outcomes of your experiment

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4. Questions

1) Write a Python program compare machine learning algorithms

5. Calculations/Computations/Algorithms

6. Presentation of Results

7. Analysis and Discussions

8. Conclusions

9. Comments

1. Limitations of Experiments

2. Limitations of Results

3. Learning happened

4. Recommendations