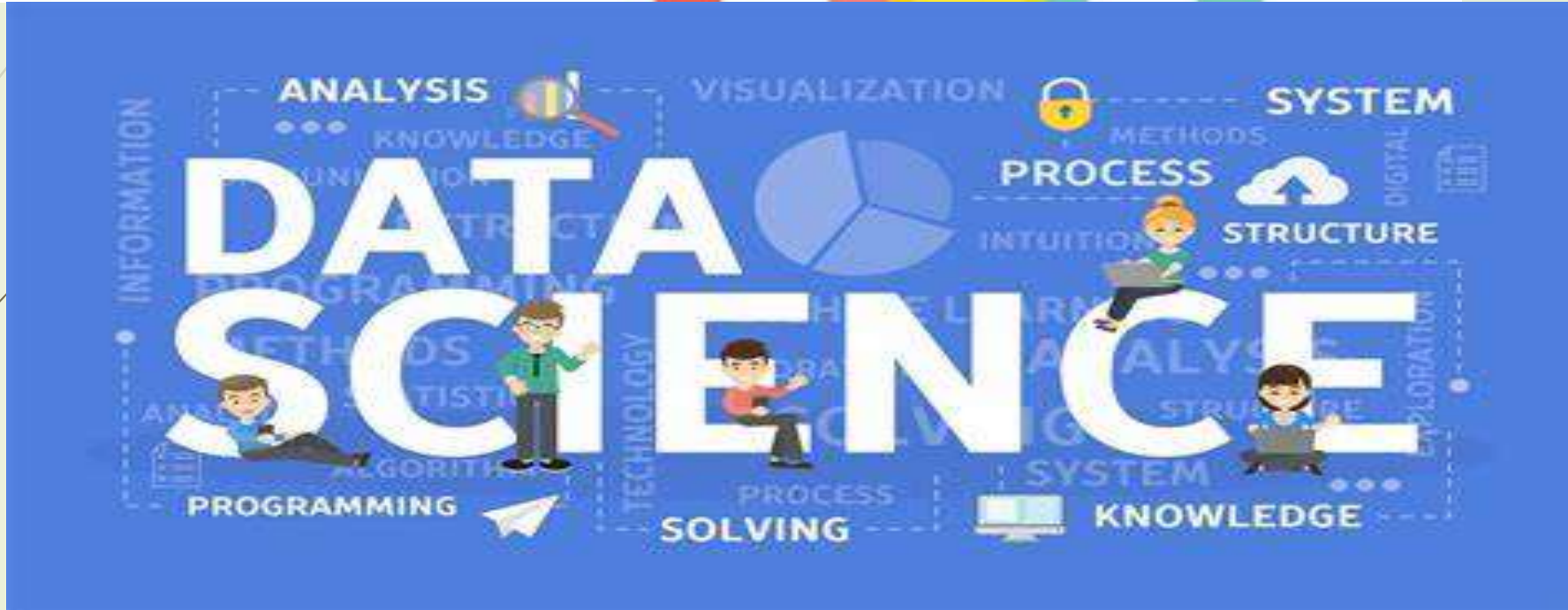


Data Science Lab

Data Science Lab



Faculty In-Charge: **Dr. Minakshi Dahiya**

Engineering Mathematics and Computing Department





Overview

- **Data Science**
- **Features of Python**
- **Python Applications**
- **DSL Location**
- **DSL Equipment Description**
- **DSL Motive**
- **Guide Lines to Students in Lab**
- **Steps to perform experiments**
- **Course Objectives**
- **List of Experiments**
- **Course Outcomes**



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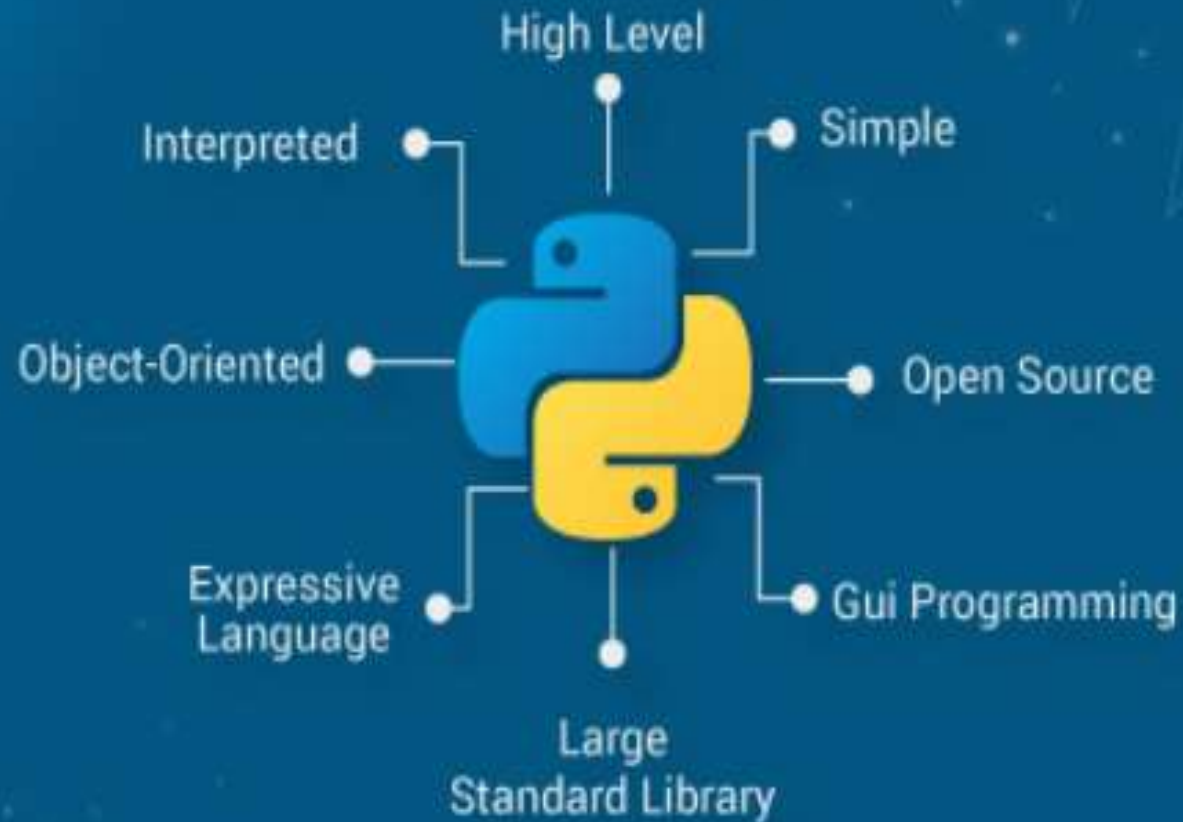


Data Science is the **technology** that can **convert** massive amount of raw and unstructured data into **meaningful insights**.

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Features of Python



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DSL Location

First Floor, MAC Deptt.



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DSL Equipment Description

- Desktop Computers: 29
- Brief Specs-Core i7, 10th Gen 8 Core, 16 GB RAM, 1TB SSD, 23.8 inches, Display, WiFi Enabled, Keyboard, Mouse, Window 10 Professional.

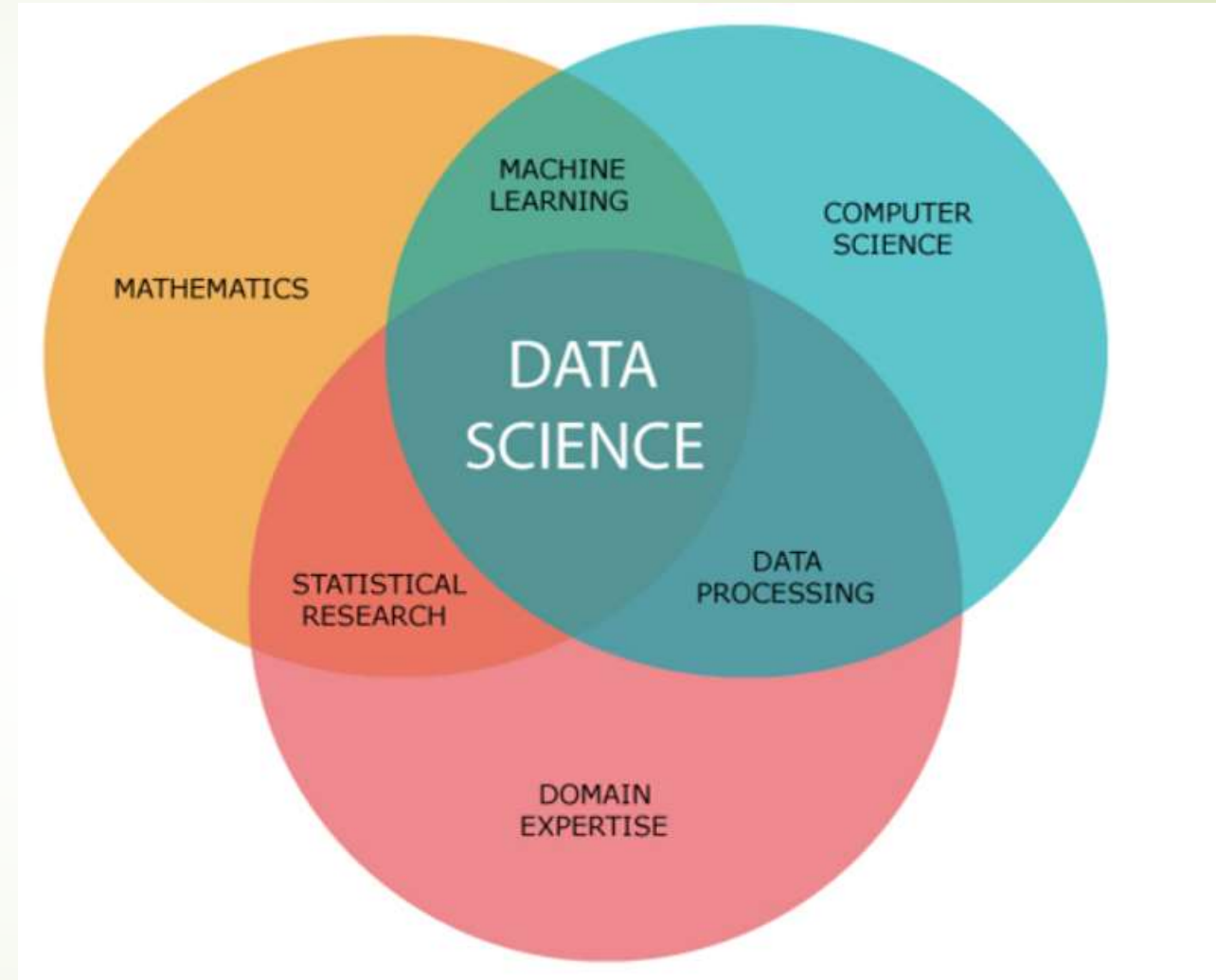


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DSL Motive

- I. The Data Science Lab has been dedicated to provide a platform to students where theoretical lectures can be translated into practical implementation through programming model and tools.
- II. In Data Science Lab our steady focus is to find the solutions of data-driven problems of Data Engineering, Data Analysis, Data Science, Artificial Intelligence and Machine Learning so that data can be transformed into valuable insights.

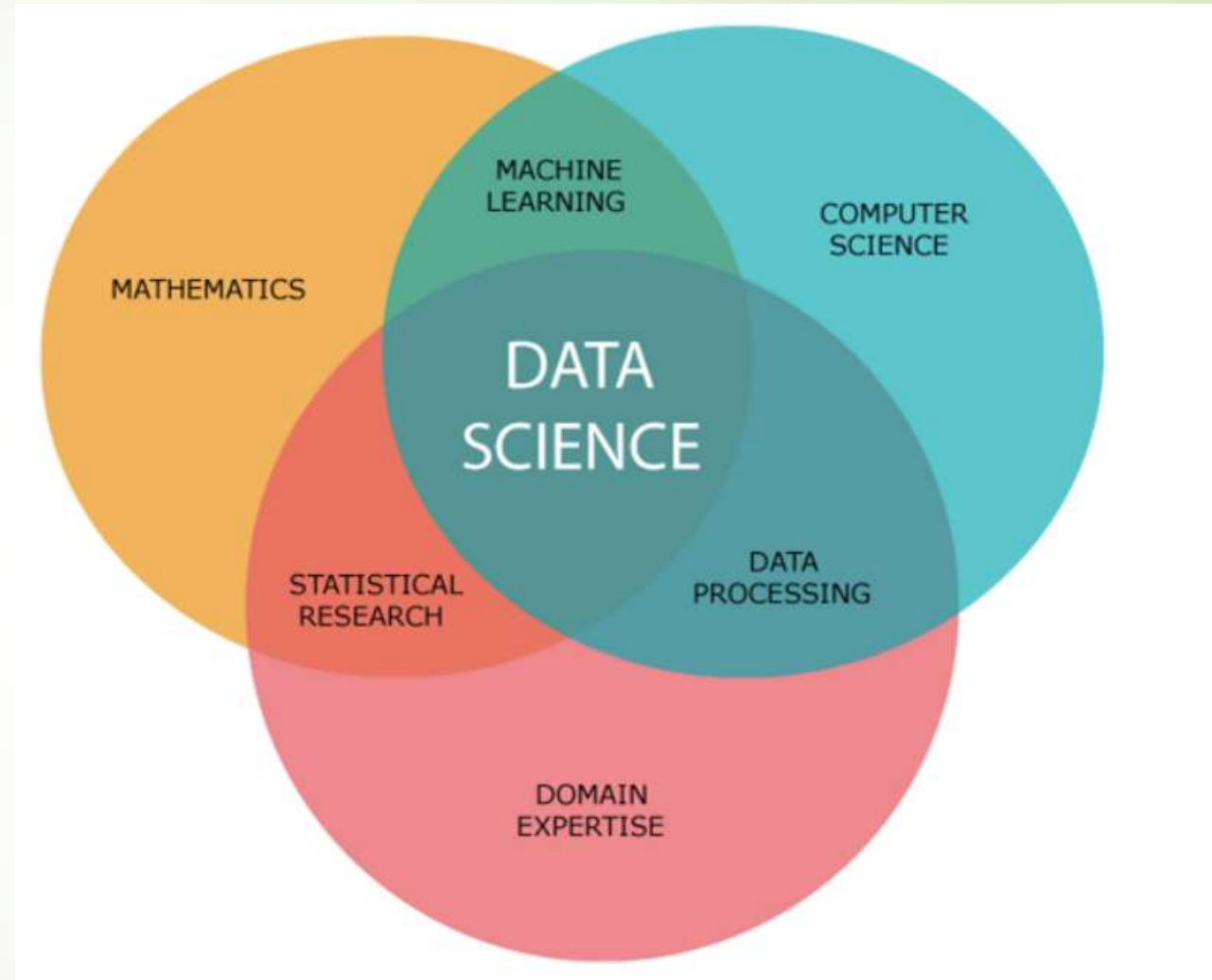




DSL Motive

III. **PYTHON** is a highly productive scripting language that is used to provide high productivity and performance to process large amounts of data in data science.

IV. The students can practice the other Programming languages like C, C++, JAVA and MATLAB also. Once students understand how to use a language, they can write the source code in a text editor, execute it on an interpreter, or compile it for execution.

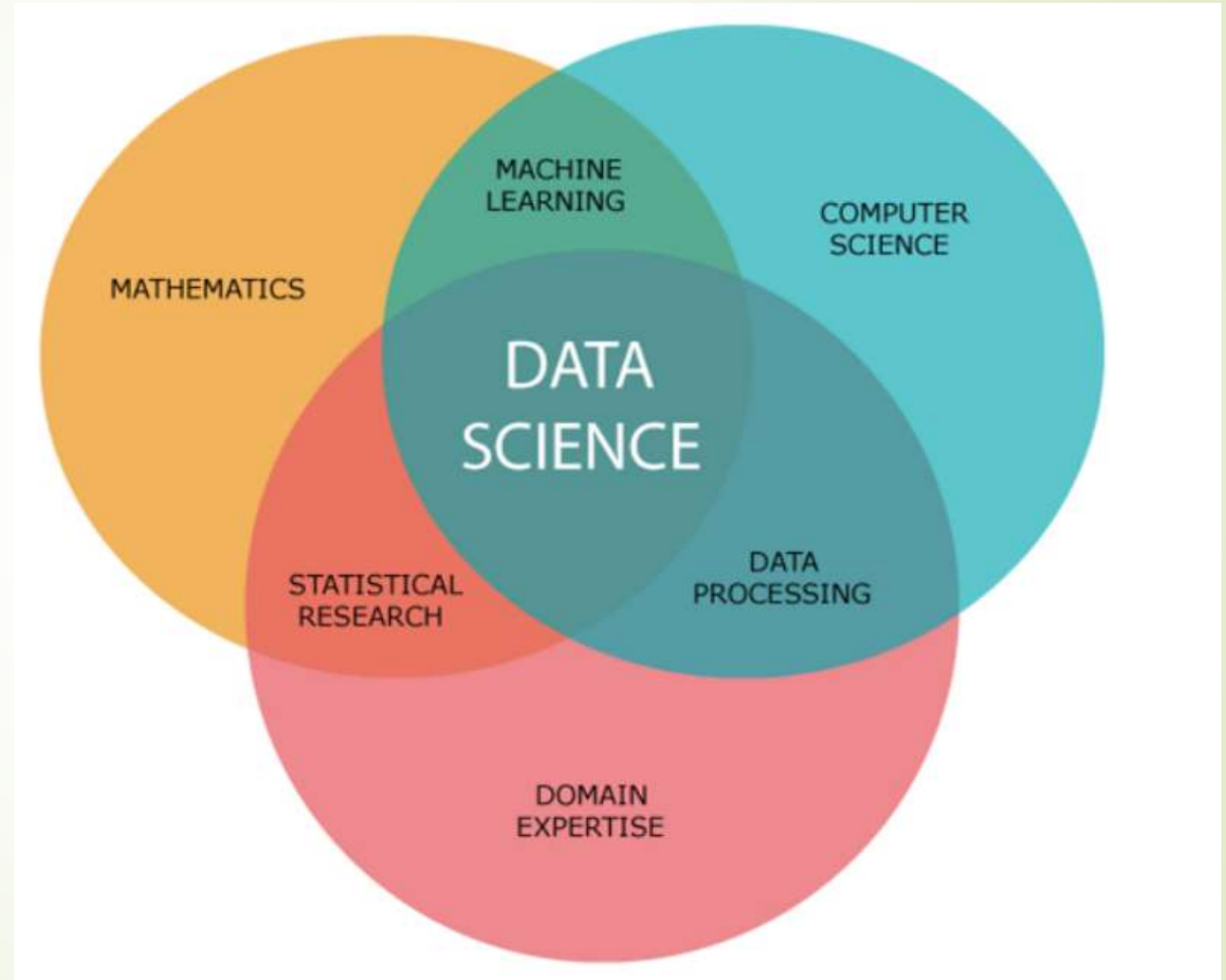




DSL Motive

V. Students try different approaches for invoking and executing PYTHON scripts and complete PYTHON coding exercises.

VI. In Data Science lab, students perform experiments, gain experience and move forward.



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Guide Lines to Students in Lab

Disciplinary to be maintained by the students in the Lab

- Students must use the equipment with care. Any damage is caused student is punishable.
- Students are not allowed to use their cell phones/pen drives/ CDs in labs.
- Students are supposed to occupy the computers allotted to them and are not supposed to talk or make noise in the lab.
- Students, after completion of each experiment they need to be updated in observation notes and same to be updated in the record.
- Lab records need to be submitted after completion of experiment.
- If a student is absent for any lab, they need to be completed the same experiment in the free time before attending next lab.

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Steps to perform experiments in the lab by the student-

- Step1: Students have to listen and understand the experiment explained by the faculty and note down the important points.
- Step2: Students have to write the Aim of the experiment in record file.
- Step3: Students need to write procedure/algorithm in the record file.
- Step4: Analyze and Develop/implement the logic of the program by the student in respective platform.
- Step5: The experiment has to be executed on the system.
- Step6: After successful execution the results are to be shown to the faculty and record it.
- Step8: Update the completed experiment in the record and submit to the concerned faculty in-charge.
- Step9: Log off/ shut down the computer system before he/she leaves the lab after completing the task (experiment) in all aspects and ensure the system / seat is kept properly.



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Course Objectives

- To provide fundamental knowledge of Python.
- To classify different type of Data Analytics.
- To organise the data collected from various sources.
- To create graphical representation through Visualization tools.
- To Handle and transform data in Data Pre-Processing.



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PYTHON

FOR DATA SCIENCE

List of Experiments

1. Write a Python Program to -

- i. Create local and global variable
- ii. Demonstrate various data types
- iii. Use conditional statement
- iv. Use For and while loops

2. Importing NumPy library, write a Python program to -

- i. create N-dim arrays
- ii. Use inbuilt function (zeros, ones, full, eye) create array
- iii. Use shape, reshape, transpose function
- iv. Use sort function and Sorting along axes





PYTHON

FOR DATA SCIENCE

List of Experiments

3. **Importing NumPy library, write a Python program to –**
 - i. Perform Arithmetic operations (Broadcast Rule)
 - ii. Use Matrix and mat function
4. **Importing NumPy library, write a Python program to –**
 - i. Use arange, linspace, logspace Function
 - ii. Array Indexing
5. **Importing NumPy library, write a Python program for –**
 - i. Slicing Arrays
 - ii. Statistical Functions
 - iii. Joining Arrays
 - iv. Splitting and Searching Arrays





PYTHON

FOR DATA SCIENCE

List of Experiments

6. Write a Python Program to handle numerical operations using math and random number functions.
7. Write a Python Program for computation on NumPy arrays using Universal Functions and Mathematical methods.
8. Write a Python Program to import a CSV file and perform various Statistical and Comparison operations on rows/columns.
9. Write a Python Program to create Pandas Series and DataFrame from various inputs.



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PYTHON

FOR DATA SCIENCE

List of Experiments

10. Write a Python Program to import any CSV file to Pandas DataFrame and perform the following:

- i.** Visualize the first and last 10 records
- ii.** Get the shape, index and column details
- iii.** Select/Delete the records(rows)/columns based on conditions.
- iv.** Perform ranking and sorting operations.
- v.** Do required statistical operations on the given columns.
- vi.** Find the count and uniqueness of the given categorical values.
- vii.** Rename single/multiple columns.





PYTHON FOR DATA SCIENCE

List of Experiments

11. Write a Python Program to import any CSV file to Pandas DataFrame and perform the following:
 - i. Handle missing data by detecting and dropping/ filling missing values.
 - ii. Transform data using different methods.
 - iii. Detect and filter outliers.
 - iv. Perform Vectorized String operations on Pandas Series.
 - v. Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.
12. Write a Python Program to use the scikit-learn package in python to implement the regression model and its related methods.





Course Outcomes

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

- **CO1: Write, test, and debug simple Python programs.**
- **CO2: Develop different type of Arrays and Matrix Functions by importing NumPy.**
- **CO3: Perform various Statistical and Comparison operations on arrays and matrix.**
- **CO4: Visualize data using graphs by importing Matplotlib.**
- **CO5: Handle and transform data by importing any CSV file to Pandas DataFrame.**



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