Alliance School of Advanced Computing

Department of Computer Science and Engineering

Class Assignment-1

Course Code: 5CS1025
Course Title: Artificial Intelligence
Semester: 04
Class : AIML

Name :- Vidya Khairnar
Class :- AIML-E
Reg.no :- 2023BCSE07AED421
https://github.com/GITVIDHUB-1010/AI_codes

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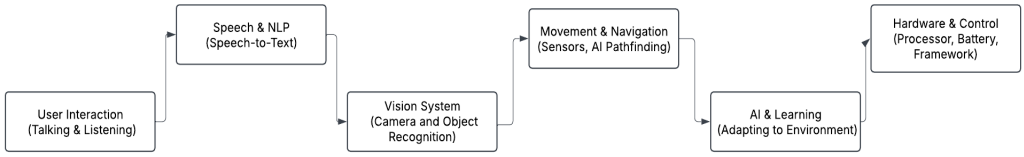
1. Imagine you are tasked with designing a humanoid robot to assist in a home or office environment. The robot must be capable of interacting with people by **talking** and **listening**, **walking** to different locations, **seeing** and recognizing objects, and **learning** from its surroundings to adapt its behavior. What technologies, tools, and frameworks would you need to build such a robot? Give as flow chart



2. Calculate and interpret mean, median, mode, variance and standard deviation for a given dataset. Data =[15,21,29,21,15,24,32,21,15,30]

```python
import numpy as np
import pandas as pd

data = [15, 21, 29, 21, 15, 24, 32, 21, 15, 30]
data_series = pd.Series(data)

mean = np.mean(data)
median = np.median(data)
mode = data_series.mode().values[0]
variance = np.var(data)
std_dev = np.std(data)


print(f"Mean {mean}")
print(f"Median  {median}")
print(f"Mode  {mode}")
print(f"Variance  {variance}")
print(f"Standard Deviation  {std_dev}")
```

```
Mean 22.3
Median  21.0
Mode  15
Variance  36.61
Standard Deviation  6.050619802962338
```

3. You are analyzing a dataset that captures the daily performance and activity of a humanoid robot in a simulated environment. The dataset link robot_dataset(robot_dataset)_1.csv includes the following attributes

Interaction_Count: Number of conversations the robot had daily.
Steps_Walked: Total steps taken each day.
Objects_Recognized: Number of objects successfully identified by the robot.
Learning_Sessions: Number of learning tasks completed.
Energy_Consumption (kWh): Daily energy usage of robots.

Perform Basic Statistical Operations:

1) What is the **average (mean)** number of conversations the robot has daily?
2) Find the **total steps walked** by the robot over a given period.
3) Determine the **maximum and minimum energy consumption** in the dataset.
4) Calculate the **correlation** between the number of steps walked and energy consumption.

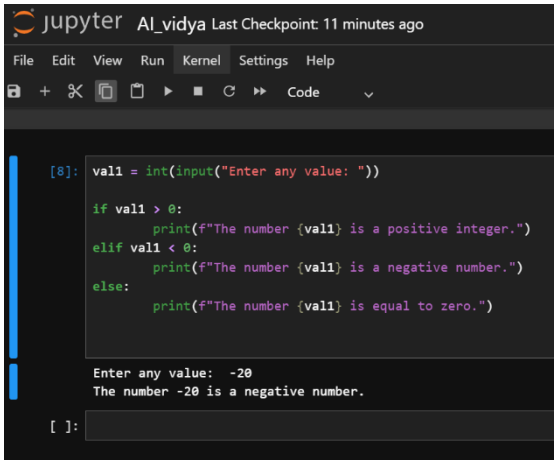
5) Analyze the **distribution** of objects recognized daily (e.g., histogram or box plot).
6) What is the **variance** in the number of learning sessions completed?

4. Write a Python program that declares variables of different data types (e.g., string, integer, float, and boolean). Output the variables in a sentence format using print() and f-strings.

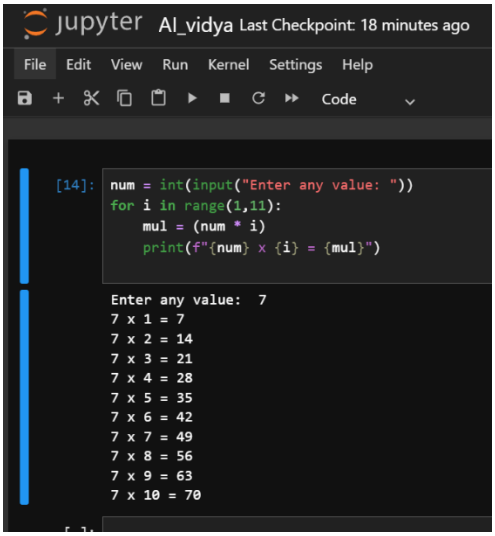
```
name = "Vidya"
ID = 456
marks = 85.7
is_student = True

print(f"My name is {name}. My ID number is {ID} and I scored {marks} in 12th, and it is {is_student}, that I am a student.")
```

```
My name is Vidya. My ID number is 456 and I scored 85.7 in 12th, and it is True, that I am a student.
```

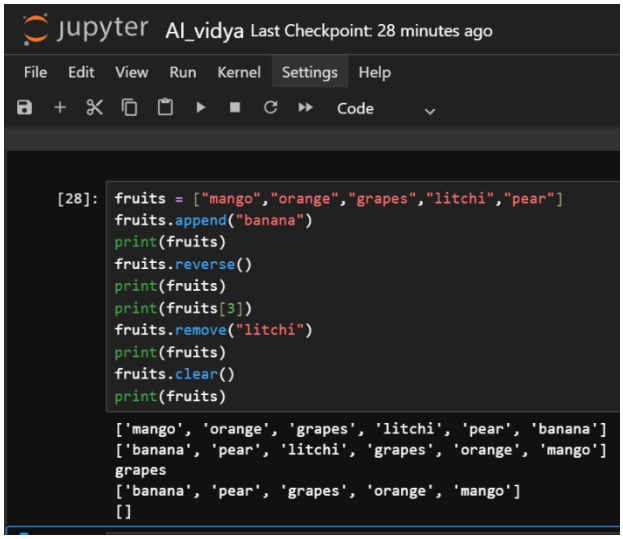
5. Write a Python program that takes an integer input and checks whether the number is positive, negative, or zero using conditional statements (if-else)



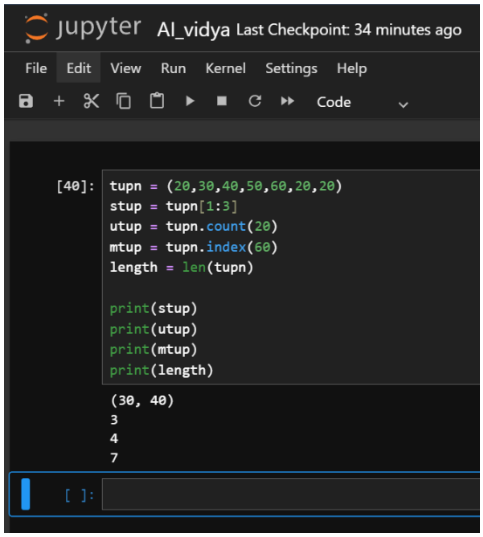
6. Write a Python program that takes a number as input and prints the multiplication table for that number (from 1 to 10)



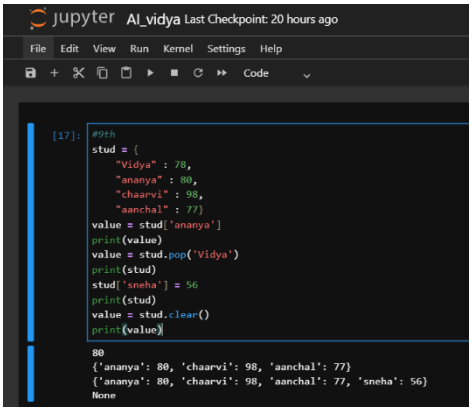
7. Create a Python list that contains the names of 5 different fruits. Perform the given operations on the list.



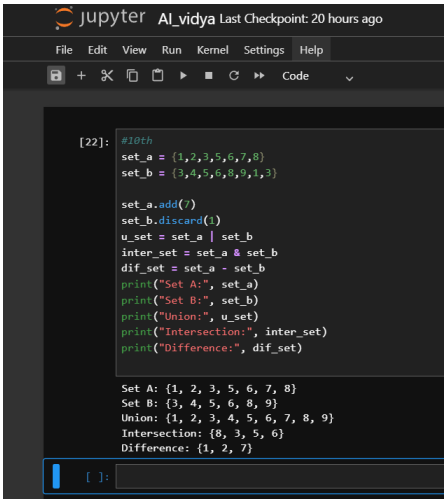
8. Write a Python program that creates a tuple containing 5 numbers. Perform the given operations on the tuple.



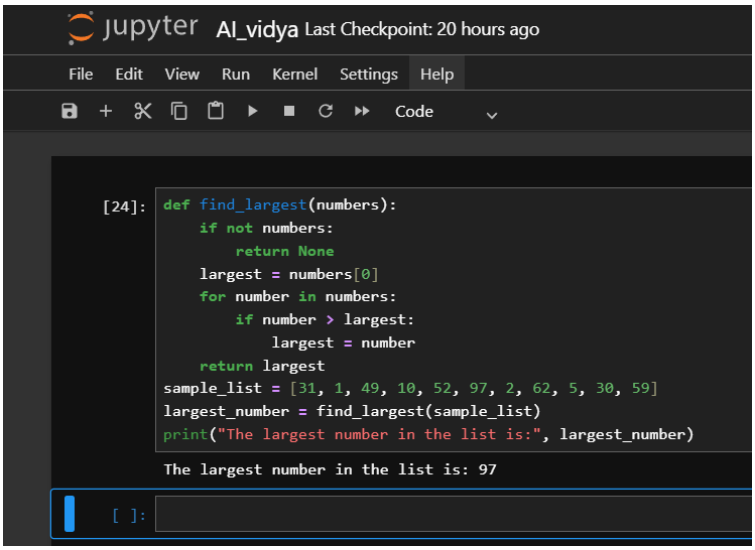
9. Create a dictionary that stores the names of 3 students as keys and their marks in mathematics as values. Perform the given operations.



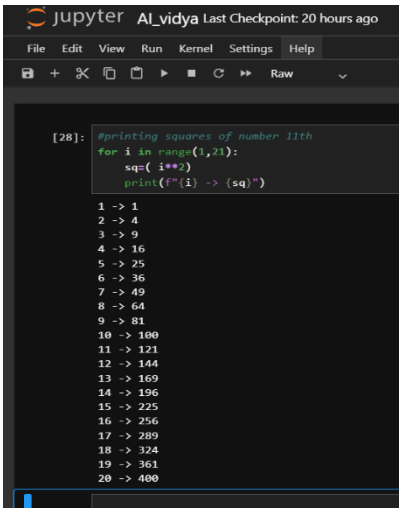
10. Create two sets of integers. Perform the given set operations



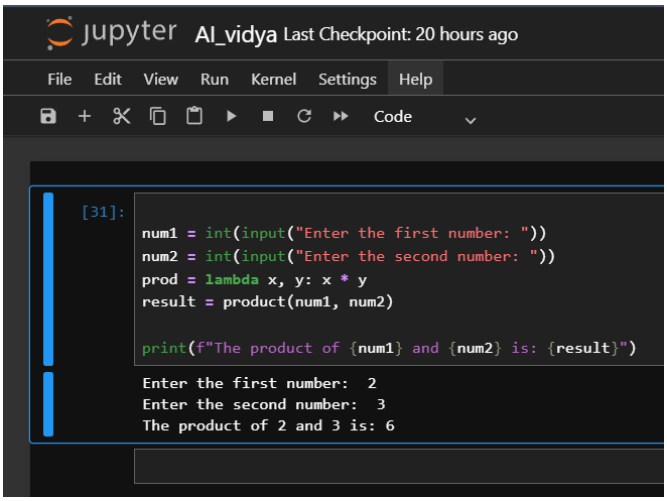
11. Write a Python function called find_largest() that takes a list of numbers as input and returns the largest number from the list. Test the function with a sample list.



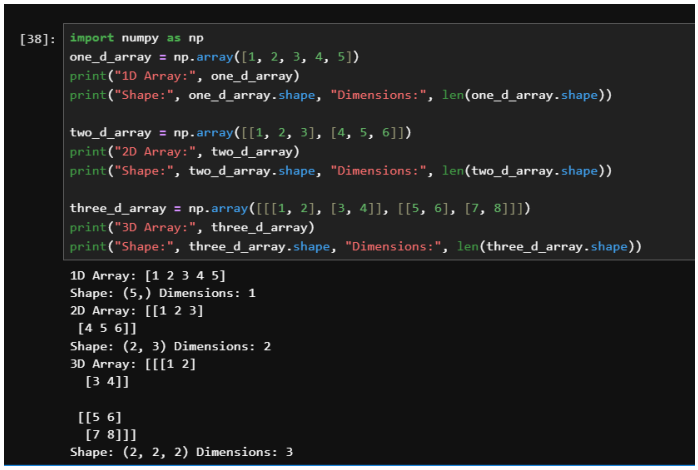
12. Use list comprehension to create a list of squares of all even numbers between 1 and 20.



13. Write a Python script that uses a lambda function to calculate the product of two numbers provided by the user.



14. Write a Python program to create a one-dimensional, two-dimensional, and three-dimensional NumPy array. Print the shape and dimensions of each array.



15. Write a Python program to create a 5x5 NumPy array of random integers and Perform array indexing as given

```
[40]: import numpy as np
      dom_array = np.random.randint(0, 100, size=(5, 5))

      print("5x5 Random Integer Array:\n", dom_array)
      print("\nElement at (0, 0):", dom_array[0, 0])
      print("First row:", dom_array[0])
      print("Last column:", dom_array[:, -1])
```

```
5x5 Random Integer Array:
 [[55 67 26 76 73]
 [70 98 93 24 74]
 [ 4 76 70 55 31]
 [17  0 34 19 74]
 [73 33 37 20 33]]

Element at (0, 0): 55
First row: [55 67 26 76 73]
Last column: [73 74 31 74 33]
```

16. create a NumPy array of shape (4, 4) containing numbers from 1 to 16. Use slicing to extract for the given conditions

```
[41]: import numpy as np
      array_4x4 = np.arange(1, 17).reshape(4, 4)
      print("4x4 Array:\n", array_4x4)

      sliced_array = array_4x4[:2, -2:]
      print("\nSliced Array (first 2 rows, last 2 columns):\n", sliced_array)
```

```
4x4 Array:
 [[ 1  2  3  4]
 [ 5  6  7  8]
 [ 9 10 11 12]
 [13 14 15 16]]

Sliced Array (first 2 rows, last 2 columns):
 [[3 4]
 [7 8]]
```

17. Write a Python program that creates a 2D array of shape (6, 2) using np.arange() and then reshapes it into a 3D array of shape (2, 3, 2). Flatten the reshaped array and print the result.

```
]:  import numpy as np
array_2d = np.arange(12).reshape(6, 2)
print("2D Array (6x2):\n", array_2d)

array_3d = array_2d.reshape(2, 3, 2)
print("\n3D Array (2x3x2):\n", array_3d)

flattened_array = array_3d.flatten()
print("\nFlattened Array:\n", flattened_array)
```

```
2D Array (6x2):
 [[ 0  1]
 [ 2  3]
 [ 4  5]
 [ 6  7]
 [ 8  9]
 [10 11]]

3D Array (2x3x2):
 [[[ 0  1]
  [ 2  3]
  [ 4  5]]

 [[ 6  7]
  [ 8  9]
  [10 11]]]

Flattened Array:
 [ 0  1  2  3  4  5  6  7  8  9 10 11]
```

18. Write a Python program to demonstrate broadcasting. Create an array of shape (3, 3) and add a one-dimensional array of shape (1, 3) to it using broadcasting.

```
[49]: import numpy as np
array_3x3 = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])
print("3x3 Array:\n", array_3x3)

one_d_array = np.array([10, 20, 30])
print("one Dimensional Array:\n", one_d_array)
broadcasted_sum = array_3x3 + one_d_array
print("\nResult aftr Broadcasting:\n", broadcasted_sum)
```

```
3x3 Array:
 [[1 2 3]
 [4 5 6]
 [7 8 9]]
one Dimensional Array:
 [10 20 30]

Result aftr Broadcasting:
 [[11 22 33]
 [14 25 36]
 [17 28 39]]
```

19. Create two NumPy arrays of the same shape, A and B. Perform the following arithmetic operations:

Element-wise addition.

Element-wise subtraction.

Element-wise multiplication.

Element-wise division.

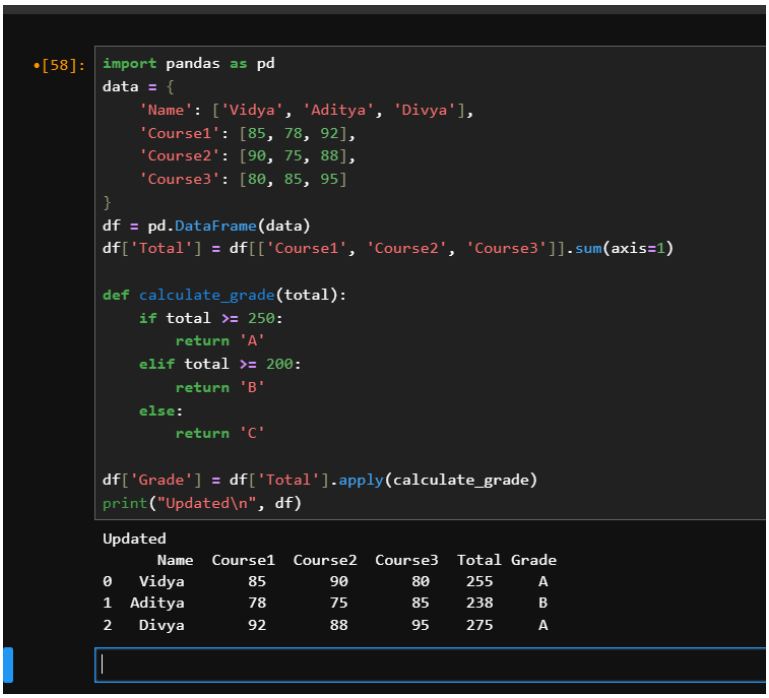
[52]:

```
A = np.array([[1, 2], [3, 4]])
B = np.array([[5, 6], [7, 8]])

add = A + B
print("Elementwise Addition:\n", add)

sub = A - B
print("\nElementwise Subtraction:\n", sub)

multi = A * B
print("\nElementwise Multiplication:\n", multi)

divi = A / B
print("\nElementwise Division:\n", divi)
```

```
Elementwise Addition:
 [[ 6  8]
 [10 12]]

Elementwise Subtraction:
 [[-4 -4]
 [-4 -4]]

Elementwise Multiplication:
 [[ 5 12]
 [21 32]]

Elementwise Division:
 [[0.2        0.33333333]
 [0.42857143 0.5       ]]
```

20. Create a Pandas DataFrame with the given Name and marks of 3 courses:

Add a new column named 'Total' that represents the sum of all the courses. Add 'Grade' based on the values of the 'Total'. Print the updated DataFrame with the new 'Total' and 'Grade' column.



```
•[58]: import pandas as pd
data = {
    'Name': ['Vidya', 'Aditya', 'Divya'],
    'Course1': [85, 78, 92],
    'Course2': [90, 75, 88],
    'Course3': [80, 85, 95]
}
df = pd.DataFrame(data)
df['Total'] = df[['Course1', 'Course2', 'Course3']].sum(axis=1)

def calculate_grade(total):
    if total >= 250:
        return 'A'
    elif total >= 200:
        return 'B'
    else:
        return 'C'

df['Grade'] = df['Total'].apply(calculate_grade)
print("Updated\n", df)
```

```
Updated
      Name  Course1  Course2  Course3  Total Grade
0   Vidya       85       90       80    255     A
1  Aditya       78       75       85    238     B
2   Divya       92       88       95    275     A
```