Lab Report

Only for course Teacher						
		Needs Improvement	Fair	Good	Excellent	Total Mark
Allocate mark & Percentage		25%	50%	75%	100%	25
Understanding/Analysis	7					
Implementation	8					
Report Writing	10					
					Total obtained mark	
Comments						

Semester: Spring 25

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Batch: 38th **Section:** A2

Course Code: SE 334 **Course Name:** Artificial Intelligence Lab

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Submission Date: 13/04/2025

Lab Report for Artificial Intelligence (SE334)

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Abstract

From this course, we will learn some of the most important parts of Artificial Intelligence using Python. We will explore from environment setup to advanced Python programming for various algorithms of Artificial Intelligence.

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Chapter 1

Lab-1: Setup Environment for Python

Installation Steps

Step 1: Visit `anaconda.org` and download the latest version of Anaconda.

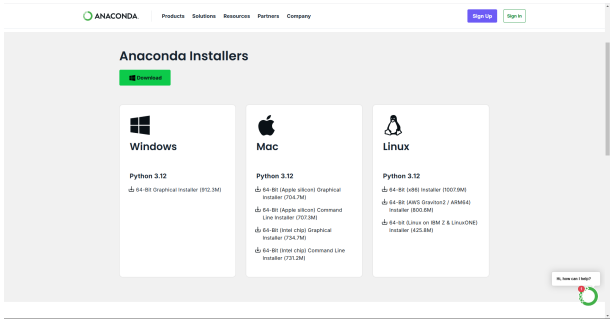


Figure 1.1: Downloading Anaconda from anaconda.org

Step 2: Install the software with all the default settings.

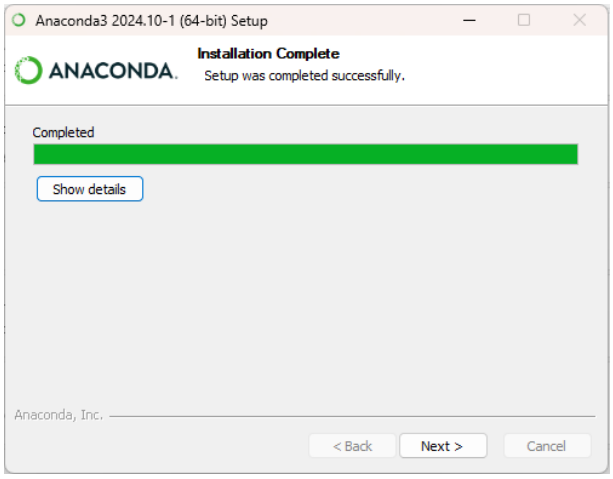


Figure 1.2: Default Installation Settings

Step 3: Create a Virtual Environment for Python using Anaconda Prompt.

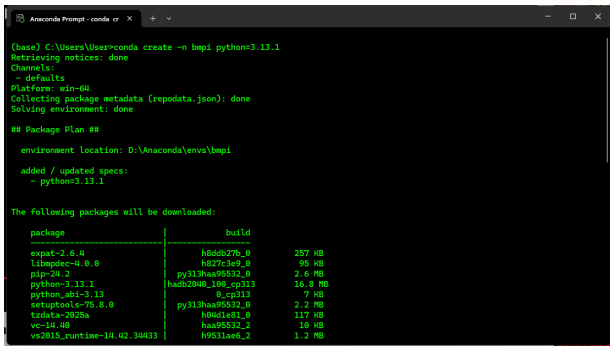


Figure 1.3: Creating a Virtual Environment

Step 4: After activating the Virtual Environment, install necessary libraries and Jupyter Notebook.

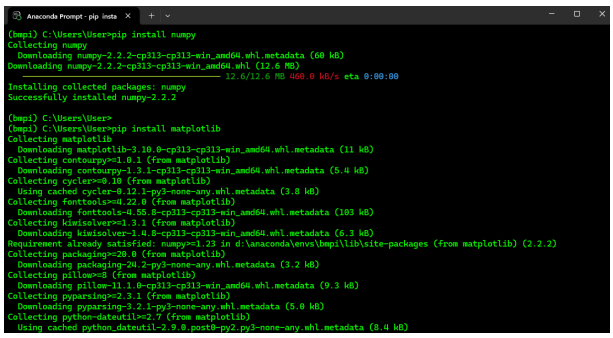


Figure 1.4: Installing Libraries and Jupyter Notebook

Step 5: Open Jupyter Notebook using the command `jupyter notebook` and create files in `.ipynb` format.

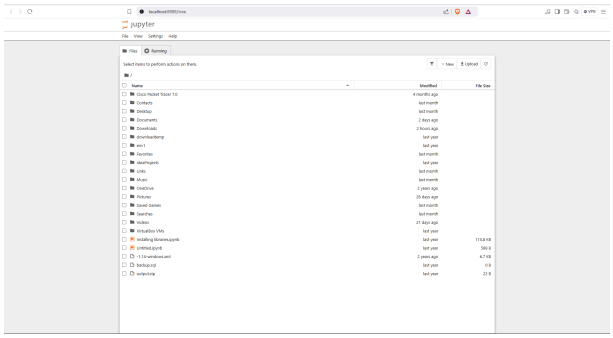
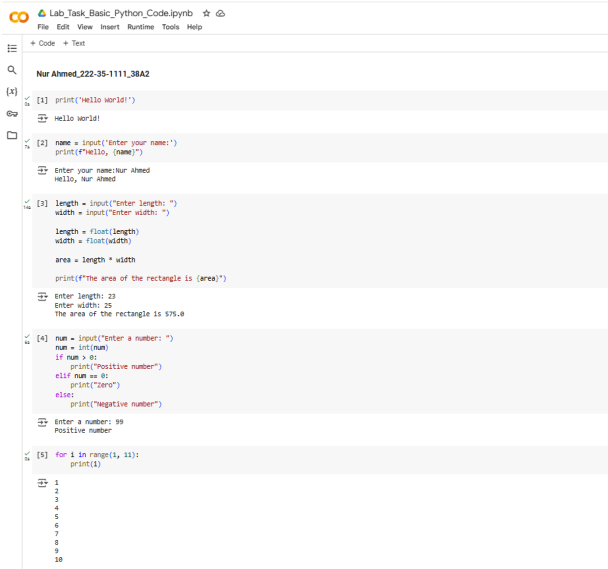


Figure 1.5: Opening Jupyter Notebook

Chapter 2

Lab-2: Basic Python Code

Here are the screenshots of the basic Python codes that I have practiced with outputs:



Lab_Task_Basic_Python_Code.ipynb

File Edit View Insert Runtime Tools Help

+ Code + Text

Nur Ahmed_222-35-1111_38A2

```
[1] print('Hello World!')
```

```
Hello World!
```

```
[2] name = input('Enter your name:')
    print(f"Hello, {name}")
```

```
Enter your name:Nur Ahmed
Hello, Nur Ahmed
```

```
[3] length = input("Enter length: ")
    width = input("Enter width: ")

    length = float(length)
    width = float(width)

    area = length * width

    print(f"The area of the rectangle is {area}")
```

```
Enter length: 23
Enter width: 25
The area of the rectangle is 575.0
```

```
[4] num = input("Enter a number: ")
    num = int(num)
    if num > 0:
        print("Positive number")
    elif num == 0:
        print("Zero")
    else:
        print("Negative number")
```

```
Enter a number: 99
Positive number
```

```
[5] for i in range(1, 11):
        print(i)
```

```
1
2
3
4
5
6
7
8
9
10
```

Figure 2.1: Basic Python Code Output 1

Lab_Task_Basic_Python_Code.ipynb

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+ Code + Text

[6]
```python
def add_numbers(a, b):
    return a + b

num1 = float(input("Enter first number: "))
num2 = float(input("Enter second number: "))
result = add_numbers(num1, num2)
print(f"The sum is {result}")
```

```
Enter first number: 2
Enter second number: 5
The sum is 7.0
```

```python
def add(a, b):
    return a + b

def subtract(a, b):
    return a - b

def multiply(a, b):
    return a * b

def divide(a, b):
    return a / b

print("Options: 1-Add, 2-Subtract, 3-Multiply, 4-Divide")
choice = int(input("Enter your choice: "))
num1 = float(input("Enter first number: "))
num2 = float(input("Enter second number: "))

if choice == 1:
    print("Result:", add(num1, num2))
elif choice == 2:
    print("Result:", subtract(num1, num2))
elif choice == 3:
    print("Result:", multiply(num1, num2))
elif choice == 4:
    if num2 != 0:
        print("Result:", divide(num1, num2))
    else:
        print("Error: Division by zero")
else:
    print("Invalid choice")
```

```
Options: 1-Add, 2-Subtract, 3-Multiply, 4-Divide
Enter your choice: 2
Enter first number: 9
Enter second number: 4
Result: 5.0
```

Figure 2.2: Basic Python Code Output 2

Lab_Task_Basic_Python_Code.ipynb

File Edit View Insert Runtime Tools Help

+ Code + Text

[8]
```python
def add(a, b):
    return a + b

def subtract(a, b):
    return a - b

def multiply(a, b):
    return a * b

def divide(a, b):
    if b == 0:
        raise ZeroDivisionError("Division by zero is not allowed.")
    return a / b
```

[9]
```python
print("Options: 1-Add, 2-Subtract, 3-Multiply, 4-Divide")
choice = int(input("Enter your choice: "))
num1 = float(input("Enter first number: "))
num2 = float(input("Enter second number: "))

if choice == 1:
    print("Result:", add(num1, num2))
elif choice == 2:
    print("Result:", subtract(num1, num2))
elif choice == 3:
    print("Result:", multiply(num1, num2))
elif choice == 4:
    if num2 != 0:
        print("Result:", divide(num1, num2))
    else:
        print("Error: Division by zero")
else:
    print("Invalid choice")
```

```
Options: 1-Add, 2-Subtract, 3-Multiply, 4-Divide
Enter your choice: 1
Enter first number: 7
Enter second number: 9
Result: 16.0
```

Start coding or generate with AI.

Figure 2.3: Basic Python Code Output 3

Chapter 3

Lab-3: Document String in Python

Here is the screenshot of the usage of Document String in Python:

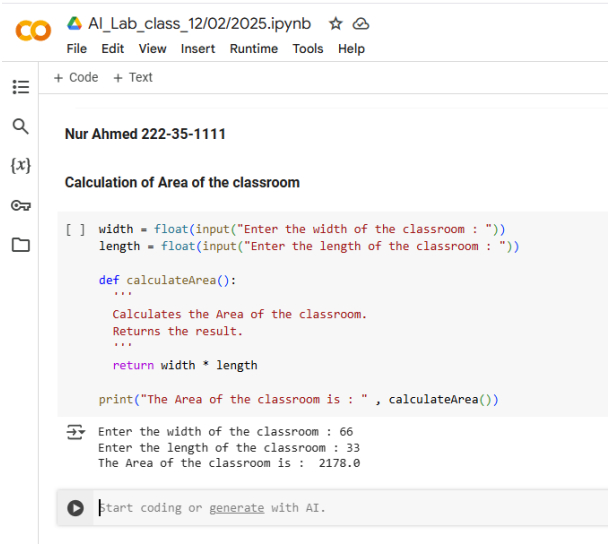
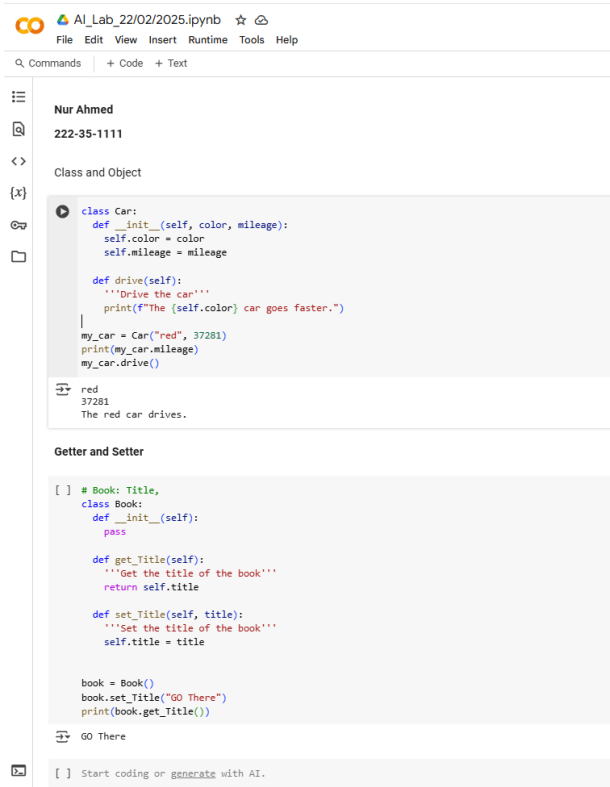


Figure 3.1: Usage of Document String in Python

Chapter 4

Lab-4: Implementation of OOP in Python

Here is the screenshot of the implementation of OOP in Python:



AI_Lab_22/02/2025.ipynb

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Class and Object

```
class Car:
  def __init__(self, color, mileage):
    self.color = color
    self.mileage = mileage

  def drive(self):
    '''Drive the car'''
    print(f"The {self.color} car goes faster.")

my_car = Car("red", 37281)
print(my_car.mileage)
my_car.drive()
```

```
red
37281
The red car drives.
```

Getter and Setter

```
# Book: Title,
class Book:
  def __init__(self):
    pass

  def get_Title(self):
    '''Get the title of the book'''
    return self.title

  def set_Title(self, title):
    '''Set the title of the book'''
    self.title = title


book = Book()
book.set_Title("GO There")
print(book.get_Title())
```

```
GO There
```

Start coding or generate with AI.

Figure 4.1: Creating Class and Object along with Getter and Setter in Python

Chapter 5

Lab-5: Solving two problems in Codeforces using Python

Here is the screenshot of the two problems that I solved in Codeforces using Python:

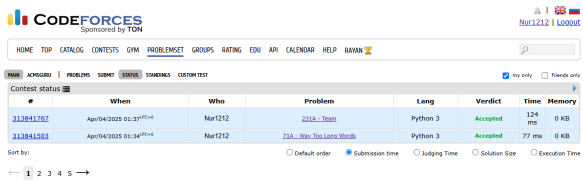
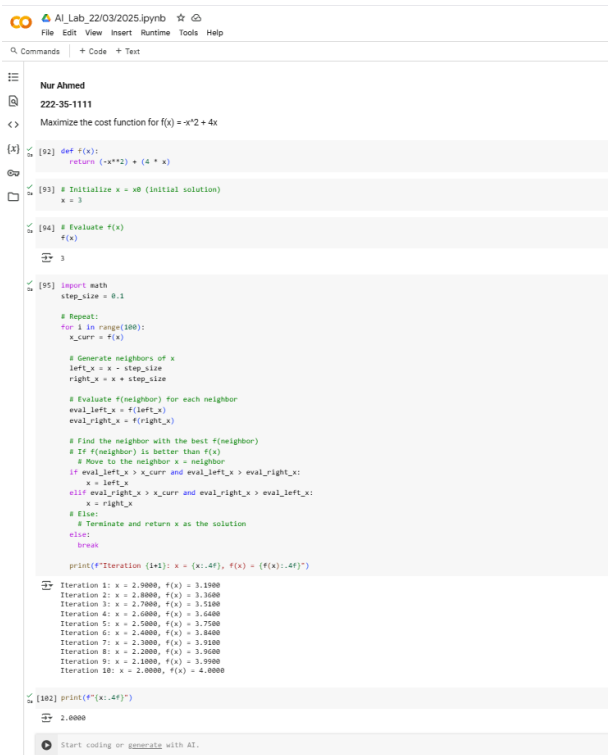


Figure 5.1: Two mild difficult problems solved in Codeforces using Python

Chapter 6

Lab-6: Maximizing the cost of f(x) = -x 2 + 4x using Hill Climbing algorithm

Here is the screenshot of the implementation of Hill Climbing algorithm for maximizing cost in Python:



AI_Lab_22/03/2025.ipynb

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Maximize the cost function for f(x) = -x^2 + 4x

```
[92] def f(x):
         return (-x**2) + (4 * x)
```

```
[93] # Initialize x - x0 (initial solution)
     x = 3
```

```
[94] # Evaluate f(x)
     f(x)
```

```
3
```

```
[95] import math
     step_size = 0.1

     # Repeat:
     for i in range(100):
       x_curr = f(x)

       # Generate neighbors of x
       left_x = x - step_size
       right_x = x + step_size

       # Evaluate f(neighbor) for each neighbor
       eval_left_x = f(left_x)
       eval_right_x = f(right_x)

       # Find the neighbor with the best f(neighbor)
       # If f(neighbor) is better than f(x)
         # Move to the neighbor x - neighbor
       if eval_left_x > x_curr and eval_left_x > eval_right_x:
           x = left_x
       elif eval_right_x > x_curr and eval_right_x > eval_left_x:
           x = right_x
       # Else:
         # Terminate and return x as the solution
       else:
         break

       print(f"Iteration {i+1}: x = {x:.4f}, f(x) = {f(x):.4f}")
```

```
Iteration 1: x = 2.9000, f(x) = 3.1900
Iteration 2: x = 2.8000, f(x) = 3.3600
Iteration 3: x = 2.7000, f(x) = 3.5100
Iteration 4: x = 2.6000, f(x) = 3.6400
Iteration 5: x = 2.5000, f(x) = 3.7500
Iteration 6: x = 2.4000, f(x) = 3.8400
Iteration 7: x = 2.3000, f(x) = 3.9100
Iteration 8: x = 2.2000, f(x) = 3.9600
Iteration 9: x = 2.1000, f(x) = 3.9900
Iteration 10: x = 2.0000, f(x) = 4.0000
```

```
[102] print(f"{x:.4f}")
```

```
2.0000
```

Start coding or generate with AI.

Figure 6.1: Hill Climbing algorithm for maximizing cost in Python

Chapter 7

Lab-7: Additional Lab Classes

Here are the screenshots of the additional lab class activities (Pandas and Matplotlib Libraries):

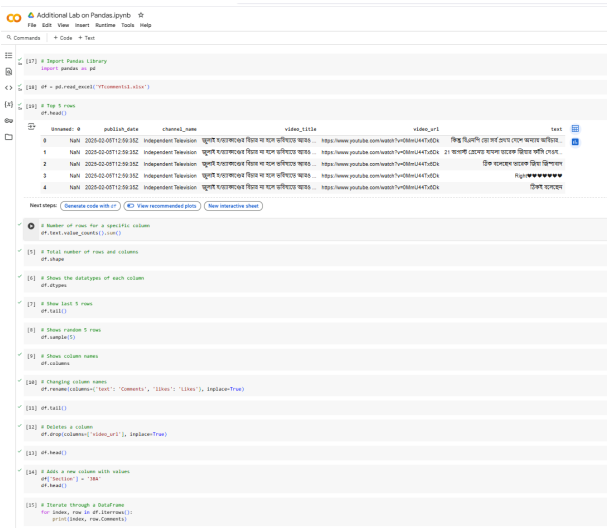

Figure 7.1: Using Pandas Library in Python

Additional Lab Class on Matplotlib.ipynb

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Commands + Code + Text

```
[16] %matplotlib inline

     # Import Matplotlib
     import matplotlib.pyplot as plt
```

```
[17] import numpy as np
```

Line plot

```
[18] # Creating an empty list
     l1 = []

     # Adding elements to the list
     for i in range(10):
       l1.append(i/2)
     l1
```

```
[19] # Generating numbers between 1 to 39
     x = range(1, 40)
     y = [i/2 for i in x]


     plt.plot(x, y, 'o')
     plt.show()
```

```
[20] # Creating a plot figure
     fig = plt.figure()

     # Creating an array of 0 to 30 numbers with 500 points
     x = np.linspace(0, 30, 500)

     # Plots the x
     plt.plot(x, np.sin(x))
```

```
[21] plt.plot(x, np.cos(x))
```

```
     x = np.linspace(0, 10, 1000)
     plt.plot(x, np.sin(x), x, np.cos(x))

     plt.xlabel('x')
     plt.ylabel('y')
     plt.title("Sin/Cos Plot")
     plt.legend(['sin(x)', 'cos(x)'])

     plt.grid(True) # Add grids
     plt.show()
```

```
     x = np.linspace(0, 10, 10)
     # reates a plot figure
```

Figure 7.2: Using Matplotlib Library in Python