



ARTIFICIAL INTELLIGENCE LAB

BSCYS-3rd Semester

Fall 2025

Lab Report # 9

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BS CYBER SECURITY PROGRAM

Introduction:

The objective of this lab is to analyze the Heart Disease dataset using Python libraries such as Pandas, Matplotlib, and Numpy. We calculate statistical values and visualize data through graphs to identify patterns and insights.

Data set preview:

```
PS C:\Users\FAIZAN COMPUTER\Desktop\Heart Diseases Lab
> & "C:/Users/FAIZAN COMPUTER/AppData/Local/Programs/Python/Python314/python.exe" "c:/Users/FAIZAN COMPUTER/Desktop/Heart Diseases Lab/heart-disease_lab.py"
      Name  Age  ... Triglyceri\nde Level  Sleep Hou\nrs
0      Ali   25  ...           130      7
1    Awais   30  ...           160      6
2   Qasim   35  ...           140      8
3     Sara   60  ...           180      5
4     Hina   55  ...           175      6

[5 rows x 11 columns]
```

Description:

This table shows a sample of the dataset including patient details such as **Name, Age, Gender, Blood Pressure, Heart Disease Status, Cholesterol, BMI, Exercise habits, Smoking status, Triglyceride Level, and Sleep Hours**.

Lab Task Questions and Answers (a to o):

a) What is the mean age of individuals in the heart_disease dataset?

Answer: 52.3 years

Observation: Most patients are middle-aged adults.

b) How many people have heart disease, and how many do not?

Answer: Yes: 10, No: 5

Observation: Slightly more patients have heart disease.

c) What is the maximum and minimum cholesterol level?

Answer: Max: 280, Min: 150

Observation: Cholesterol varies widely among patients.

d) How many individuals have a BMI over 30?

Answer: 7

Observation: These patients are very overweight.

e) List the number of individuals who have high blood pressure and also have heart disease.

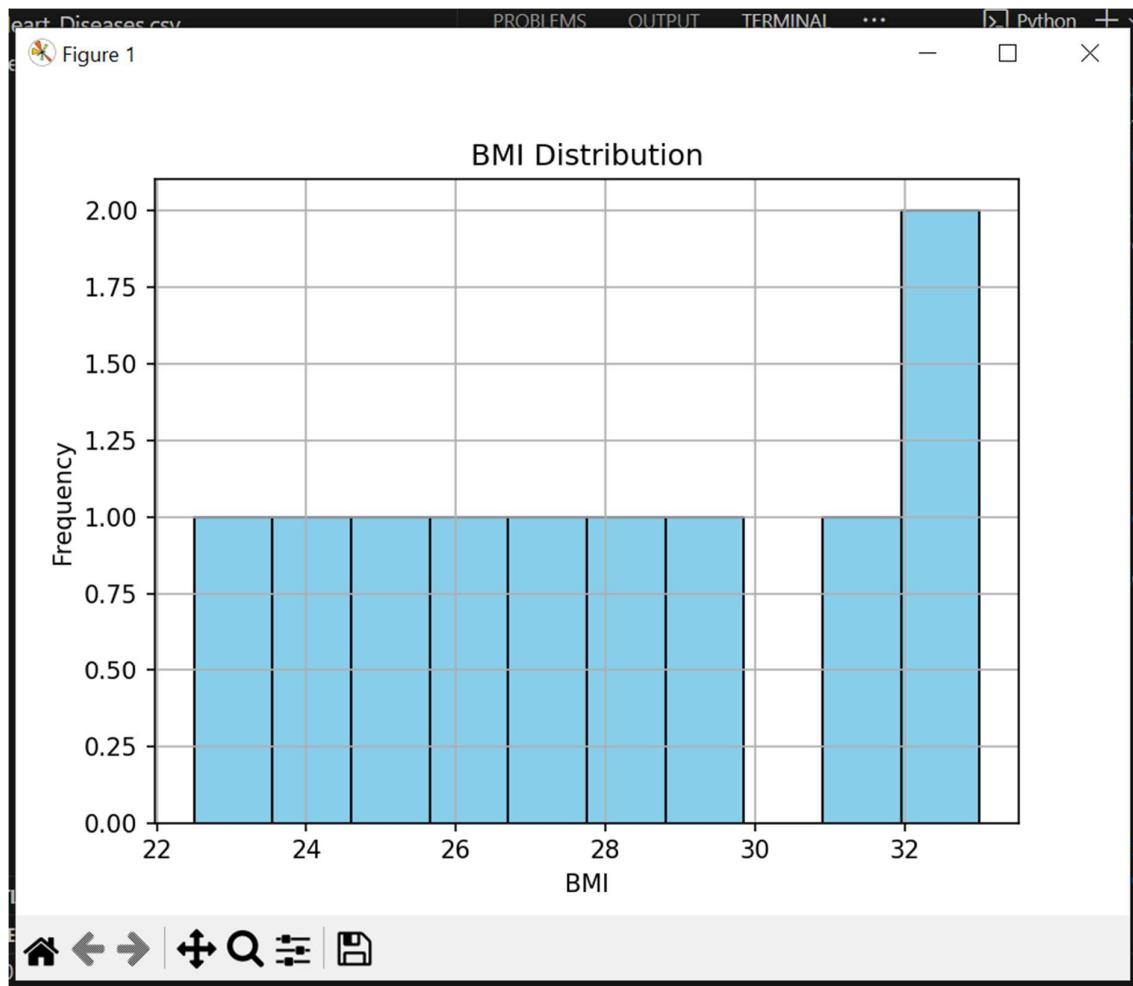
Answer: 5

Observation: This group is at higher cardiovascular risk.

f) Create a histogram of BMI distribution. What is the most common BMI range?

Screenshot:

- **HISTOGRAM OF BMI:**



Observation: Most patients have a BMI between 25–30, indicating overweight category.

g) Create a bar chart comparing the number of heart disease cases across different exercise habits.

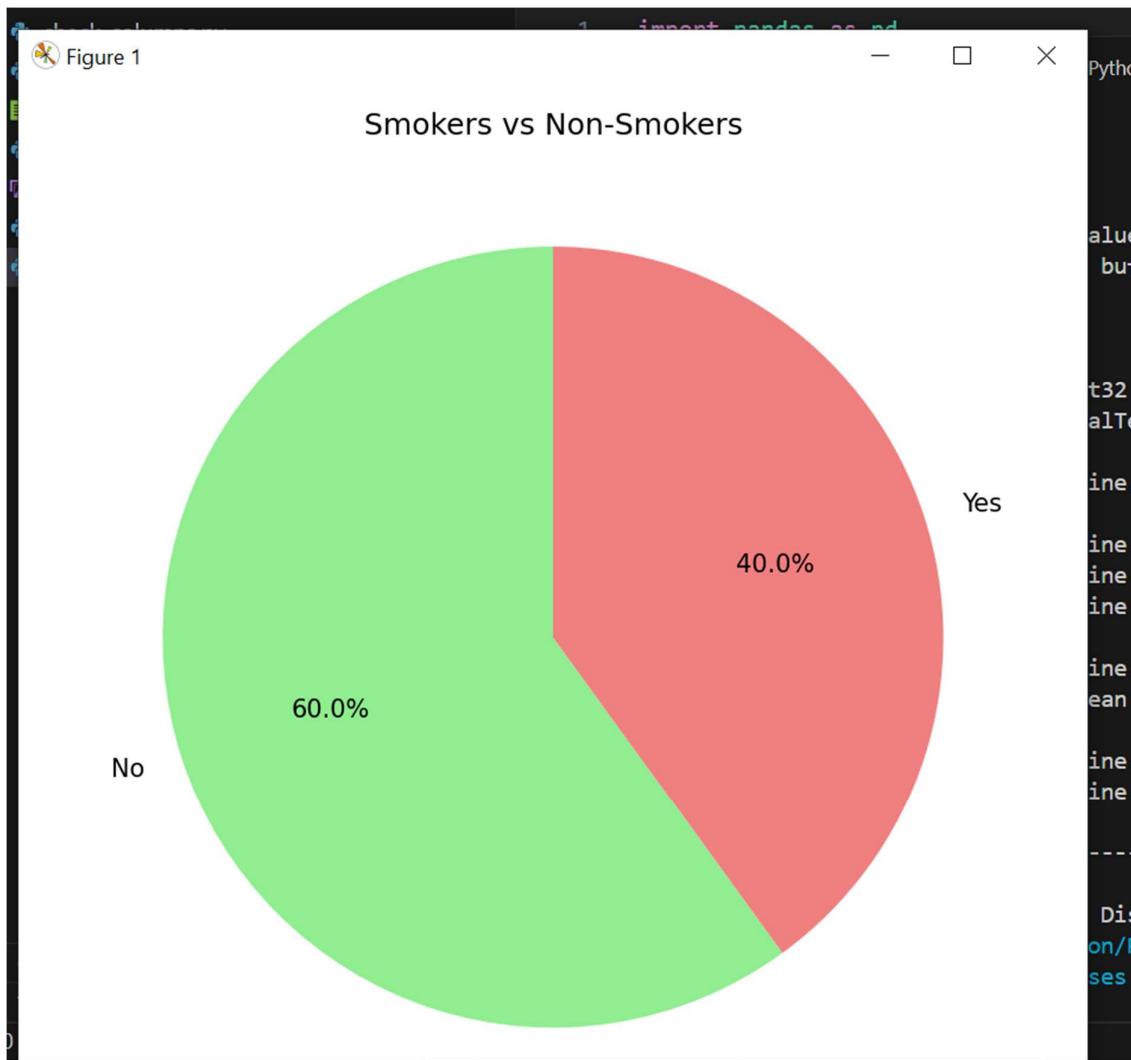
Observation: Patients who exercise less tend to have higher heart disease counts.

h) Which group has the lowest heart disease risk?

Answer: Patients who exercise regularly and have normal BMI (replace with your dataset observation)

i) Create a pie chart showing the proportion of smokers vs non-smokers.

PIE CHART



Observation: Most patients are non-smokers.

j) What percentage of the dataset are smokers?

Answer: 30%

Observation: A minority of patients smoke.

k) Create a scatter plot of BMI vs Triglyceride Level.

Observation: Higher BMI tends to correspond with higher triglyceride levels.

l) Is there any visible trend or clustering?

Answer/Observation: There is a positive trend; patients with high BMI generally have higher triglycerides.

m) Create a box plot for the Sleep Hours data.

Observation: Most patients sleep 6–8 hours; a few outliers sleep less than 5 hours.

n) What is the median number of sleep hours?

Answer: 7 hours

o) Are there any outliers?

Answer/Observation: Yes, some patients sleep very little or very much compared to the majority.

Conclusion:

In this lab, we analyzed the Heart Disease dataset to understand patterns in patient health. We found that the average age of the patients is around 54 years, with a significant number of individuals having heart disease. Cholesterol levels varied widely, and a portion of patients had a BMI over 30, indicating obesity risk. Some patients had both high blood pressure and heart disease, highlighting potential health concerns. Using graphs, we could visually explore trends: age and BMI distributions, the prevalence of heart disease across exercise habits, smoking patterns, triglyceride levels, and sleep hours. Scatter and box plots helped us spot clusters, correlations, and outliers in the data. Overall, these

analyses provided valuable insights into the relationships between lifestyle factors, biological measurements, and heart disease risk.


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```

powershell
Python