

EXPT NO:3	Designing Multivariate Patterns
DATE: 12.01.2026	

PRE-LAB QUESTIONS (PROVIDE BRIEF ANSWERS TO THE FOLLOWING QUESTIONS)

1. Why is multivariate analysis essential in real-world AI problems?

Real-world AI problems involve multiple related variables.

Multivariate analysis helps understand complex relationships and improves model accuracy.

2. What challenges arise when visualizing high-dimensional data?

High-dimensional data causes visual clutter and overlapping points.

This makes interpretation and pattern identification difficult.

3. How does correlation analysis support feature selection?

Correlation analysis identifies strongly related variables.

It helps remove redundant features and select important ones.

4. What are ethical concerns in healthcare data visualization?

Patient privacy and data confidentiality must be protected.

Misleading visualizations can lead to incorrect medical decisions.

5. Give examples of multivariate data in AI systems.

Patient health records and financial risk datasets are multivariate.

Image features and recommendation system data are also examples.

IN-LAB EXERCISE:

CODE :

```

# EXPERIMENT: Multivariate Data Visualization
# STUDENT ROLL NO: 23BAD101

head(x3_healthcare_data)
colnames(x3_healthcare_data)

x3_healthcare_data$AgeGroup <- cut(
  x3_healthcare_data$Age,
  breaks = c(19, 35, 50, 70),
  labels = c("Young", "Middle", "Senior")
)

pairs(
  x3_healthcare_data[, c("Age", "BMI", "Glucose_Level", "Blood_Pressure")],
  col = x3_healthcare_data$AgeGroup,
  main = "Scatter Plot Matrix of Health Indicators"
)

cor(
  x3_healthcare_data[, c("Age", "BMI", "Glucose_Level", "Blood_Pressure")]
)
|

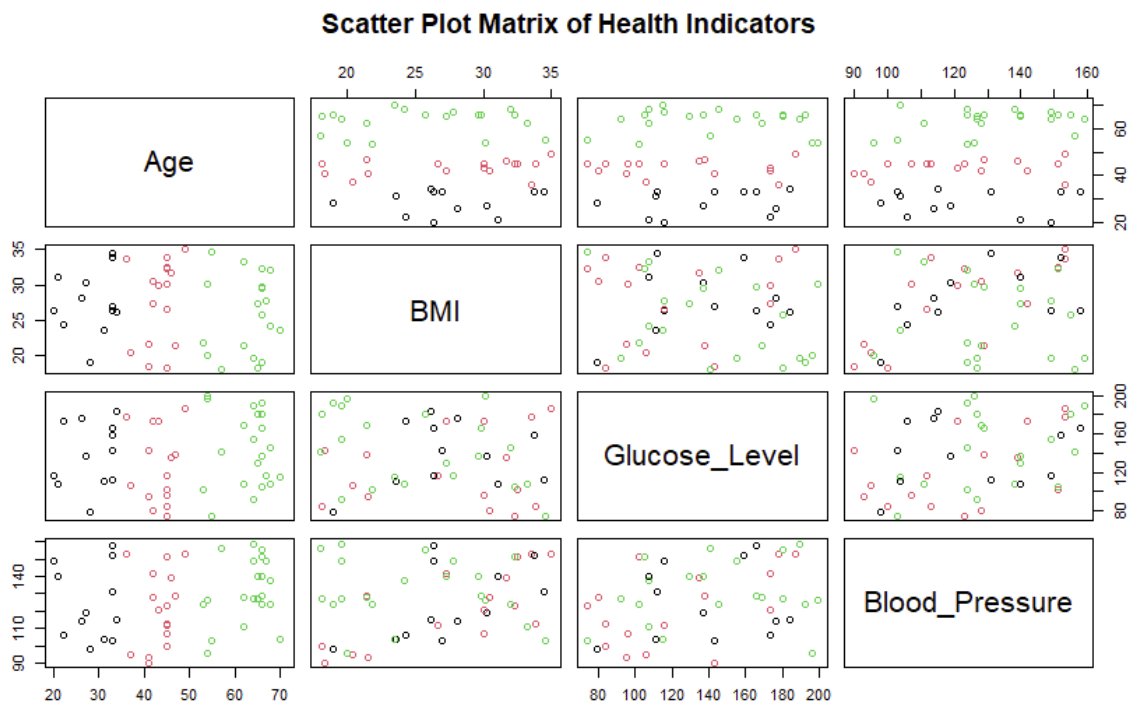
```

OUTPUT :

```

      Age      BMI Glucose_Level Blood_Pressure
Age      1.0000000 -0.1538252      0.1146740      0.1672128
BMI     -0.1538252  1.0000000     -0.1210590      0.2485257
Glucose_Level  0.1146740 -0.1210590      1.0000000      0.2582461
Blood_Pressure 0.1672128  0.2485257      0.2582461      1.0000000
> |

```



POST-LAB QUESTIONS (PROVIDE BRIEF ANSWERS TO THE FOLLOWING QUESTIONS)

1. Which health parameters show strong correlation?

BMI and glucose levels show strong positive correlation.
Age also shows moderate correlation with blood pressure.

2. Why correlation does not imply causation in medical data?

Correlation only shows association, not direct cause.
Other hidden factors may influence both variables.

3. How can these patterns assist predictive healthcare AI?

They help identify risk factors early.
This improves disease prediction and treatment planning.

4. What visualization limitations exist for high-dimensional data?

Too many variables cause cluttered and confusing plots.
Important patterns may be hidden or lost.

5. How can dimensionality reduction improve visualization?

It reduces data into fewer important components.
This makes visualization simpler and easier to interpret.

ASSESSMENT

Description	Max Marks	Marks Awarded
Pre Lab Exercise	5	
In Lab Exercise	10	
Post Lab Exercise	5	
Viva	10	
Total	30	
Faculty Signature		