

EXPT NO:1	
DATE: 06.01.2026	

Implementation of data charts

PRE-LAB QUESTIONS:

1. How can visualization help an academic institution improve student outcomes?

Visualization converts large volumes of academic data into easy-to-understand graphs. It helps institutions identify weak students, difficult subjects, and performance trends early, enabling timely academic interventions and improved teaching strategies.

2. Which chart types are suitable for comparing subject-wise performance?

- **Bar Chart** – To compare average marks across different subjects
- **Box Plot** – To analyze variation, median, and outliers in subject performance

3. What type of data scale is used for student marks?

Student marks are measured using a **ratio scale**, as they have equal intervals, meaningful order, and a true zero value.

4. Why should raw academic data be cleaned before visualization?

Raw data may contain missing values, duplicates, or incorrect entries. Cleaning ensures accurate analysis and prevents misleading visual interpretations.

5. How does visualization support evidence-based decision making?

Visualization provides clear visual evidence of patterns and trends, allowing decisions to be made based on actual data rather than assumptions.

IN-LAB EXERCISE:

OBJECTIVE:

To design appropriate data charts to analyze and compare academic performance indicators.

SCENARIO:

An autonomous engineering college wants to analyze internal assessment performance of first-year students across five subjects to identify difficult courses and improve teaching strategies.

IN-LAB TASKS (Using R Language)

- Load required R libraries (ggplot2, dplyr)
- Import dataset using read.csv()
- Perform basic data preprocessing
- Create bar chart for subject-wise average marks
- Generate line chart for performance trend across tests
- Plot pie chart for grade distribution

CODE:

```

geom_line(size = 1) +
geom_point(size = 2) +
labs(title = "Performance Trend Across Internal Tests",
  x = "Internal Test",
  y = "Average Marks") +
theme_minimal()

grade_data <- data %>%
  group_by(Final_Grade) %>%
  summarise(Count = n())

ggplot(grade_data, aes(x = "", y = Count, fill = Final_Grade)) +
  geom_bar(stat = "identity", width = 1) +
  coord_polar("y") +
  labs(title = "Final Grade Distribution") +
  theme_void()

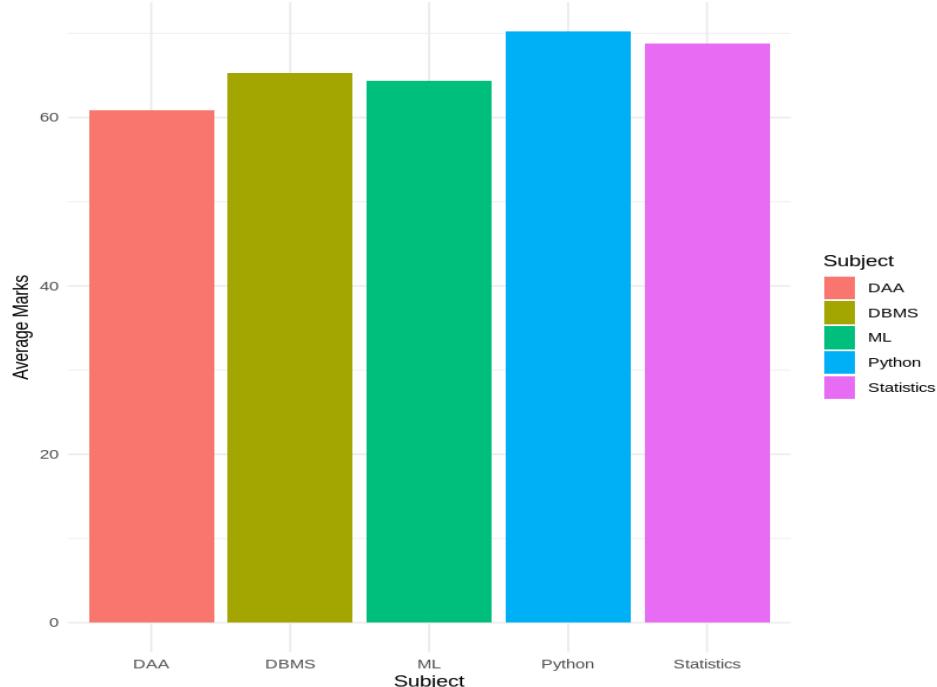
```

OUTPUT:

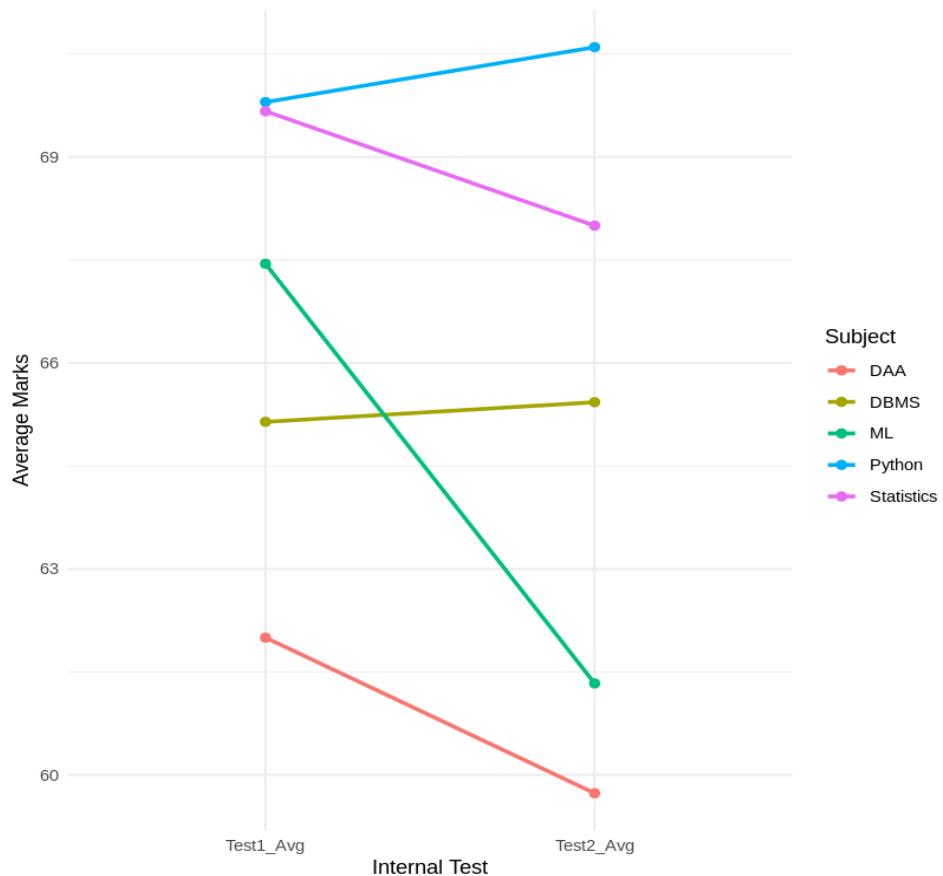
[1]	"NAME: K.Shobika"									
[1]	"ROLL NUMBER: 23BAD113"									
'data.frame': 50 obs. of 9 variables:										
\$ Student_ID : int 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 ...										
\$ Department : chr "IT" "AI&DS" "IT" "IT" ...										
\$ Semester : int 6 5 6 5 6 7 7 5 7 7 ...										
\$ Subject : chr "Statistics" "DAA" "DAA" "ML" ...										
\$ Internal_Test1 : int 81 84 45 67 67 83 83 59 69 50 ...										
\$ Internal_Test2 : int 73 74 42 60 43 94 85 67 73 47 ...										
\$ Assignment_Marks : int 11 16 19 12 16 19 18 13 18 11 ...										
\$ Attendance_Percentage: int 71 67 81 97 76 86 86 94 72 91 ...										
\$ Final_Grade : chr "D" "A" "A" "C" ...										
Student_ID: 0 Department: 0 Semester: 0 Subject: 0 Internal_Test1: 0 Internal_Test2: 0 Assignment_Marks: 0 Attendance_Percentage: 0 Final_Grade: 0										
A data.frame: 6 × 10										
	Student_ID	Department	Semester	Subject	Internal_Test1	Internal_Test2	Assignment_Marks	Attendance_Percentage	Final_Grade	Average_Internal
	<int>	<fct>	<int>	<fct>	<dbl>	<dbl>	<dbl>	<dbl>	<fct>	<dbl>
1	1001	IT	6	Statistics	81	73	11	71	D	77.0
2	1002	AI&DS	5	DAA	84	74	16	67	A	79.0
3	1003	IT	6	DAA	45	42	19	81	A	43.5
4	1004	IT	5	ML	67	60	12	97	C	63.5
5	1005	AI&DS	6	DAA	67	43	16	76	B	55.0
6	1006	AI&DS	7	DAA	83	94	19	86	D	88.5

Student_ID	Department	Semester	Subject	Internal_Test1
Min. :1001	AI&DS:15	Min. :5.00	DAA	:15 Min. :40.00
1st Qu.:1013	CSE :15	1st Qu.:5.00	DBMS	: 7 1st Qu.:52.50
Median :1026	IT :20	Median :6.00	ML	: 9 Median :67.00
Mean :1026		Mean :5.86	Python	:10 Mean :66.36
3rd Qu.:1038		3rd Qu.:6.00	Statistics	: 9 3rd Qu.:79.50
Max. :1050		Max. :7.00		Max. :88.00
Internal_Test2	Assignment_Marks	Attendance_Percentage	Final_Grade	
Min. :42.00	Min. :10.00	Min. :66.00	A:10	
1st Qu.:52.00	1st Qu.:12.00	1st Qu.:81.00	B:16	
Median :64.00	Median :13.00	Median :88.50	C:12	
Mean :64.48	Mean :14.06	Mean :86.22	D:12	
3rd Qu.:74.00	3rd Qu.:17.00	3rd Qu.:94.75		
Max. :94.00	Max. :19.00	Max. :99.00		
Average_Internal				
Min. :41.50				
1st Qu.:58.75				
Median :65.50				
Mean :65.42				
3rd Qu.:73.88				
Max. :88.50				

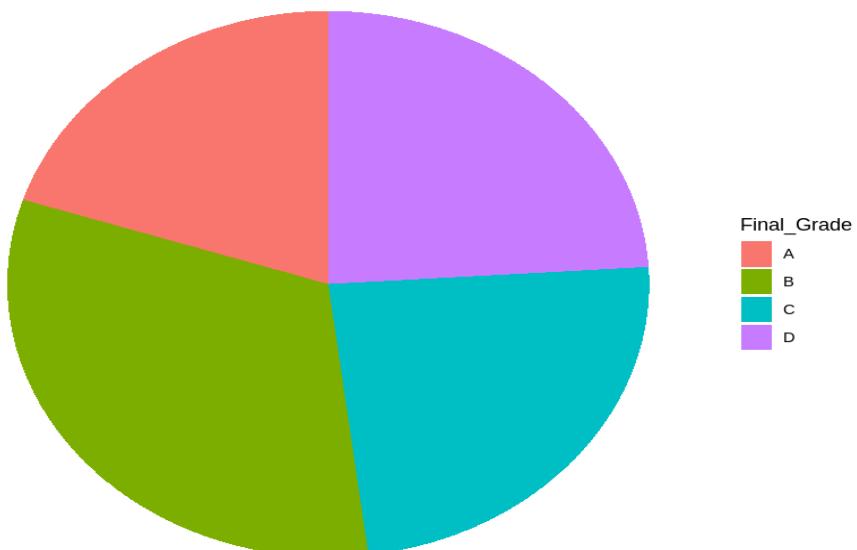
Subject-wise Average Internal Marks



Performance Trend Across Internal Tests



Final Grade Distribution



POST-LAB QUESTIONS:

1. Which subject shows consistently low performance and why?

DAA shows consistently low performance as it has the lowest overall average marks and poor scores in both Internal Test 1 and Internal Test 2.

2. Why is a line chart suitable for trend analysis?

A line chart clearly shows changes over time, making it easy to observe improvement or decline in performance across multiple assessments

3. What limitations does a pie chart have in analytics?

- Difficult to compare similar values
- Cannot show trends over time
- Becomes cluttered with many categories

4. How can this analysis help curriculum planning?

It helps identify difficult subjects, allowing curriculum planners to add extra tutorials, modify syllabus structure, or improve teaching methods.

5. How can such visualizations be integrated into AI-driven academic analytics

AI systems can use these visualizations to predict at-risk students, automate performance dashboards, and enable early academic interventions.

ASSESSMENT

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