

Assignment → 3

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Course → BCA Cybersecurity

Subject → foundations of
Data - driven
decision making

Course code → ETSEDDIII

Serial No →

Task 1 - Descriptive Statistics

Product	Units sold	Price per unit	Revenue
Laptop	15	5000	75000
mouse	40	500	20000
Keyboard	25	1500	37500
Monitor	10	12000	120000
Charger	30	800	24000
Laptop	18	5000	90000
Mouse	55	500	27500
Keyboard	20	1500	30000
monitor	8	12000	96000
Charger	35	800	28000

Unit Sold values:

15, 40, 25, 10, 30, 18, 55, 20, 8, 35

$$\text{Mean} = \frac{\text{Sum of all values}}{\text{Number of values}}$$

$$\text{Sum} = 256$$

$$\text{Mean} = \frac{256}{10} = 25.6$$

Median:

8, 10, 15, 18, 20, 25, 30, 35, 40, 55

For 10 values, median = average of 5th
26th value

$$\text{Median} = \frac{(20 + 25)}{2} = 22.5$$

Standard Deviation

$$SD = \sqrt{\frac{\sum (C_i - \bar{C})^2}{n-1}}$$

$$SD \approx 15.556$$

~~task~~ Task 2 -

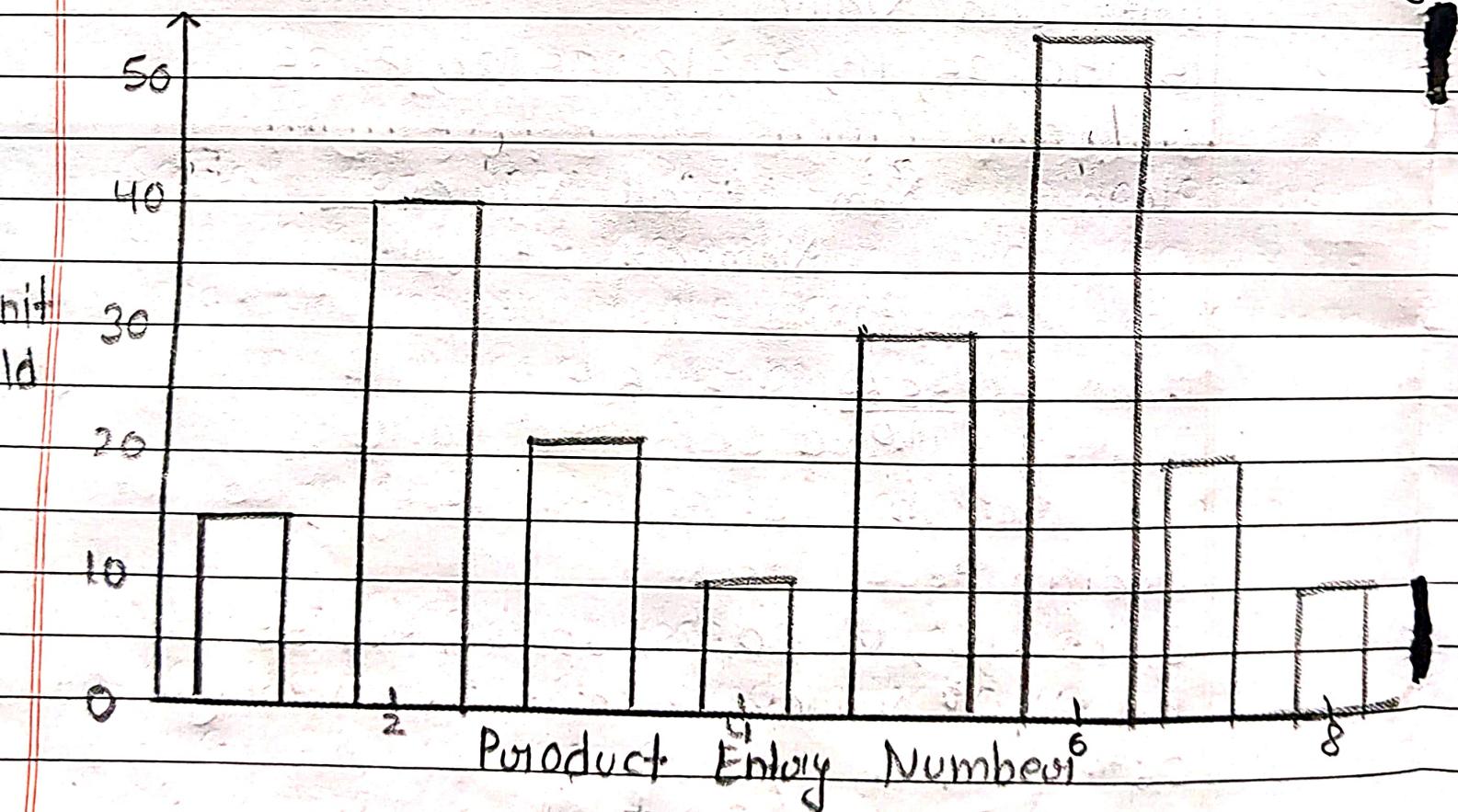
Unit Sold Values:

15, 40, 25, 10, 30, 18, 55, 20, 8, 35

Revenues:

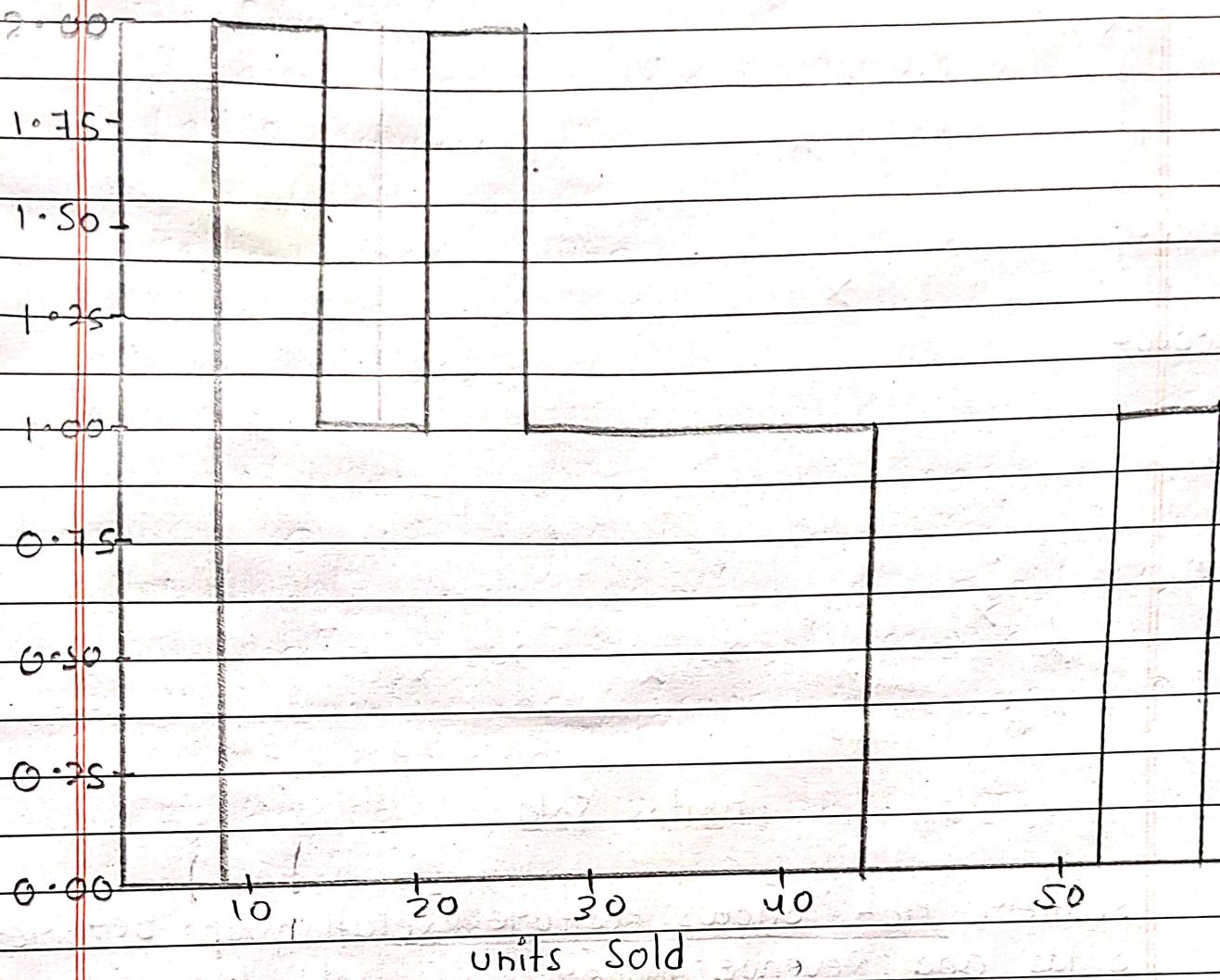
750000, 20000, 37500, 120000, 24000, 900000,
27500, 30000, 96000, 28000

Chart 1 - Bar chart (Units Sold by Product Entry)



Bar chart ~~reveals~~ shows that Mouse (Row 7) and Laptop (Row 6) have highest unit sold while Monitor (Row 8) has lowest

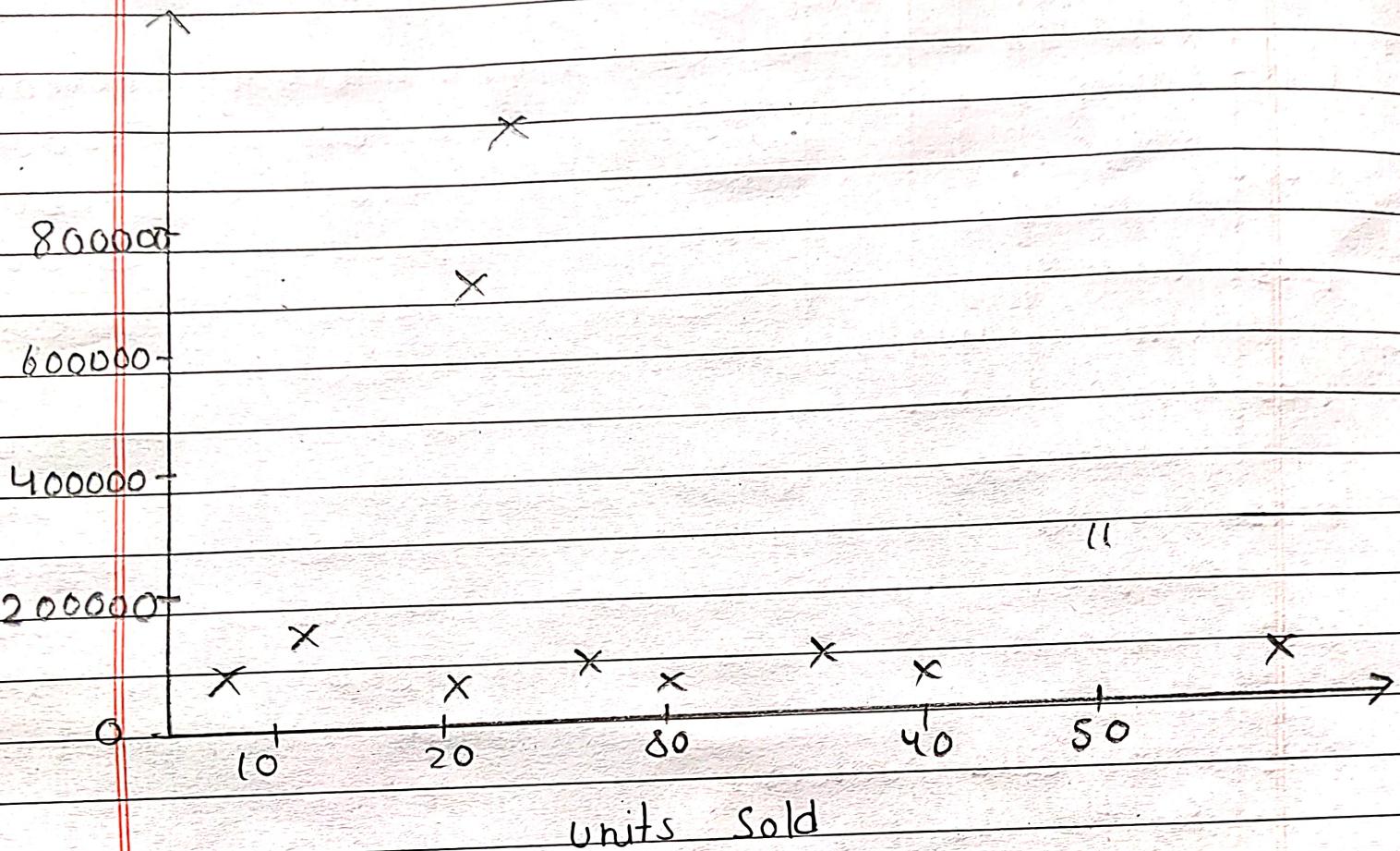
Chart-2 Histogram (Distribution of units Sold)



Histogram shows that most product falls in 10-30 units sold Range, while very high sales (above 50) are rare.

This indicates sales are mostly moderate with few peaks.

Chart - 3 Scatter Plot (Units Sold vs Revenue)



Scatter Plot shows Positive Relationship between Sales and Revenue. Higher units sold generally lead to Higher Revenue, confirming that demand strongly influences earnings.

task - 3 - Insights Based on visualisation

Insight 1 - High variation in unit sold (Bar chart)
the chart shows large difference in units sold across entries

Like Laptop (Entry 8) and Mouse (Entry 7) have much higher sales than others while monitor (Entry 6) has lowest

Decision :- focus marketing and stock on top selling units while analysing why them not sold

Insight 2 - Majority sales are in Mid - Range (Histogram)

It indicates that most units sold falls between 10 and 30

only few entries show high sales (above 50)
Decision - Plan inventory based on mid - range demand, with bulk stock for high - demand items

Insight 3 - Positive Relationship between Sales & Revenue (Scatter Plot)

It shows that higher units sold lead to higher revenue, confirming positive correlation

Decision - Boosting sales volume through promotion or discounts can increases total revenue

Insight 4 outliers in sales performance
one of two entries shows high sales (55 units) which creates spikes in both bar & scatter chart

Decision - Investigate chart caused spikes -
Reasonable demand discount our marketing

Insight - 5 Consistent Medium Performance across Products

Several entries (20-30 units) show performances

Decision - these products can form core inventory because they ensure monthly Revenue

task - 4 Reflection on How Visual Storytelling Enhances Data Interpretation

It plays a crucial role in understanding data because it transforms numbers into clear meaningful patterns. Bar charts, Histogram & Scatter Plot helped simplify complex sales informations by showing trends

Bar chart allowed quick comparison of sales across different, which makes it easy to identify which items performed well and weak. Histogram showed distribution of units sold, to understand whether sales were uncentrated in specific range. Scatter Plot highlights relationship between units sold & Revenue, visually confirming positive correlation

task-1 Define 3-4 KPIs for Marketing

A company wants to improve performance of its digital marketing company to increase customer sales

KPIs for Marketing

1. Conversion Rate

Measures how many website visitors take the desired action (purchase, sign-up etc.)
why it matters: Show campaign effectiveness

2. Customer Acquisition (CAC)

total marketing cost - number of new customers acquired

why it matters:- Helps evaluate marketing budget efficiency

3. Click-through Rate (CTR)

Percentage of people who clicked on ad/post out of those who saw it.

why it matters:- Indicates have attracted ads/content

4. Return on Marketing Investment (RoMI)

Revenue generated from marketing - marketing cost) / marketing cost

why it matters:- Shows profitability of marketing efforts -

task - 2 Data - Driven Decision Plan (Marketing)

1. Identify Problem

website traffic is high, but conversions are low

2. Data to use

- website analytics (CTR, bounce rate)
- Ad performance data
- Customer behaviour data
- Sales data related to marketing campaigns

3. Decision Steps

Step A : Analyse CTR and engagement data

If CTR < industry benchmark, Revise ad creatives

Step B : Optimize landing pages

use heatmaps and user session recording to identify

Step C : Improve audience targeting

use demographic and behavioural data to target

Step D : Allocate budget based on performance

shift budget towards campaigns with high ROI

4. Justification -

- Data ensures decisions are based on performance trends, not assumptions
- Optimization reduces CAC and increases ROI
- Better targeting increases conversion rate

task -3 Performance tracking through feedback Loops

1. Weekly KPI is Review Loops
 - Track CTR conversion rate, and CAC weekly
 - Identify what's improving and declining
 - Make small adjustments (testing ads)
2. Monthly Marketing Performance Loop
 - Compare monthly ROI with previous months
 - Evaluate which campaigns deliver strongest ROI
 - Reallocate budget for next month accordingly
3. Customer feedback Loop
 - Collect feedback through surveys or website forms.
 - Analyze sentiments from social media mentions and comments.
 - Use this feedback to improve content and ads

tools for Tracking

- Google Analytics
- Meta / Google Ads
- CRM System
- Excel dashboards or Power BI charts

Test = 4 - One Page Executive Summary

The report evaluates effectiveness of current marketing effort using key performance indicators (KPIs) such as conversion rate, customer acquisition cost (CAC), click-through rate (CTR) and return on marketing investment (RoMT). This highlights that while website traffic is high engagement and conversions remain below

Data-driven decision plan was developed by analyzing customer behavior, ad performance and sales outcome. The approach focuses on landing pages, improving and creating and reallocating market budgets toward high performing campaigns.

Assignment Task Q

4. Task 1 :- Design a short survey (5-10 questions) to collect feedback about students satisfaction at your college.

Objective :- To collect feedback on student satisfaction at the college.

Survey questions :-

Ques-1 How satisfied are you with the quality of teaching at your college?

very satisfied / satisfied / neutral / dissatisfied / very dissatisfied.

Ques-2 How would you rate the college infrastructure (classroom, labs, library etc.)

Excellent / Good / Average / Poor.

Ques-3 Are you satisfied with the support provided by faculty members?

Yes / No / Somewhat.

Ques-4 How satisfied with the extracurricular activities and student clubs?

very satisfied / satisfied / neutral / dissatisfied.

Ques-5 How would you rate the cleanliness and hygiene of the campus?

Excellent / Good / Average / Poor.

Ques-6 How satisfied are you with the placement and internship opportunities?

very satisfied / satisfied / neutral / dissatisfied / not applicable.

Ques-7 Do you feel your feedback is valued and acted upon by the administration?

- Always / Sometimes / Rarely / Never.
- 8 Very How easy is it to access online learning resources and wi - fi ?
Very easy / easy / Neutral / difficult.
- 9 Would you recommend this college to others ?
Definitely / Maybe / Not sure / No.
- 10 Any suggestions for improvement ?
(open - ended response).

Task 9 : Collect 10-15 responses (real or simulated) and store them in a spreadsheet.

Student ID	Teaching	Infrastructure	Activities	placement	Recommend
1	Satisfied	Fraud	Neutral	Satisfied	Definitely
2	very satisfied	Excellent	Satisfied	very satisfied	Definitely
3	Neutral	Average	Dissatisfied	Neutral	Maybe
4	Dissatisfied	Poor	Poor	Dissatisfied	No
5	Satisfied	Good	Satisfied	Satisfied	Definitely
6	very satisfied	Excellent	Very satisfied	Very satisfied	Definitely
7	Neutral	Average	Neutral	Neutral	Maybe
8	Satisfied	Good	Satisfied	Satisfied	Definitely
9	Dissatisfied	Poor	Poor	Dissatisfied	No
10	Satisfied	Good	Neutral	Neutral	Maybe
11	very satisfied	Excellent	Satisfied	Satisfied	Definitely
12	Neutral	Average	Neutral	Neutral	Maybe

- 3 Task 3 : Identify and fix issues such as missing data, duplicate entries, or inconsistent formatting.

Common issues / identities :-

1. Missing data :-

- * Example :- Student 3 didn't answer question 10 (activities).
- * Fix :- Replace with "no activities provided" or leave blank unintentionally with a note.

2. Duplicate entries :-

- * Example :- If the same student filled out the form twice (duplicate student ID).

- * Fix :- keep only the latest or most complete entry.

3. Inconsistent formatting :-

- * Examples :- "Very satisfied" and "very satisfied" (case inconsistency).

- * Fix :- Standardize all responses (capitalize the first letter, consistent spelling.)

4. Data type errors :-

- * Example :- Numeric ID stored as text.

- * Fix :- convert it to proper data type in spreadsheet.

5. Extra spaces or typos :-

- * Examples :- "Excellent instead of "Excellont".

- * Fix :- Use excel functions like TRIM() and FIND and REPLACE to correct.

4. Task 4 :- Write a short note on ethical considerations while collecting personal data.

When collecting and analyzing personal data, it is important to follow ethical guidelines to ensure privacy and fairness.

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When collecting and analyzing personal data, it is important to follow ethical guidelines to ensure privacy and fairness:

1. Informed consent : Participants should know why the data is being collected and how it will be used.
2. Confidentiality : Responses must be kept private and not shared without permission.
3. Data minimization : only collect information that is necessary for the study.
4. Anonymity : Do not include identifying details such as names or contact numbers unless required.
5. Data security : Store responses in password-protected files or secure platforms.
6. Honesty and transparency : Avoid manipulating results and report findings truthfully.
7. Right to withdraw : Participants should be allowed to skip questions or withdraw at any time.

(b) External data sources

- * Social Media Platforms - customer opinions, brand mentions and sentiment
- * Market Research Reports - industry trends and competition

4. Task 4:- Reflect on how adopting a data-driven approach can improve decision quality in daily life or business

Adopting a data-driven approach allows both individuals and organizations to make objective

* In Business

Companies that analyze data draw insights into customer behavior, market trends, and operational performance

* In daily life

Individuals can use data from mobile health apps or budgeting tools

→ Conclusion :-

A data-driven mindset transforms decision-making by turning raw data into actionable insights, leading to smarter choices and continuous improvement in both business and everyday life.

Assignment Task 1

1.

Task 1 :- describe a real - world scenario where decision are made using data (eg., marketing, education, healthcare).

In the healthcare industry, data plays a vital role in improving patient care and hospital efficiency. Hospitals and clinics collect large volumes of data such as patient demographics, medical history, lab test results, and treatment outcome. By analyzing for example, Hospitals use predictive analytics to identify patients at risk of developing chronic diseases such as diabetes or heart disease by examining previous benefits:

- ★ Improved Patient care and safety
- ★ Efficient Resource allocation
- ★ Early detection and prevention of disease
- ★ Cost Reduction and improved Hospital management

2. Task 2 :- compare and contrast descriptive and prescriptive models using example

(a) Descriptive models

- * It analyze past data to understand what has happened
- * They summarize and describe the characteristics of a dataset
- * Purpose - Answer the question "what Happened?"

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Task 1

Ques Describe a real-world scenario where decision are made using data.

Electronic Health Records (EHR)

- EHR to track patients' medical histories and predict potential health risks.
- By analyzing patient data, doctors can identify patterns of diseases, recommend preventive measures, and create personalized treatment plans.

Task 2

Ques

→ Descriptive, Predictive and Prescriptive Models using data.

1. Descriptive Model

- Description: Focuses on summarizing historical data to understand what has happened.
- Ex: Hospitals analyse past patient admission rates to determine which seasons see higher hospital occupancy.

2. Predictive Model

- Description: Uses statistical algorithms and machine learning to predict future outcomes based on past data.
- Example: Predicting which patients are at

risk of developing diabetes based on their medical history and lifestyle data

3. Prescriptive Model: Suggests actions or decisions which can help achieve desired outcome.

Example: Recommending an optimal treatment plan for cancer patients by analyzing success rates of various therapies.

Task 3

Please list and categorize at least 5 internal and external data sources for a company of your choice.

Internal

- 1 Electronic Health Records
- 2 Patient Feedback and Surveys
- 3 Hospital Financial Data
- 4 Staff Performance
- 5 Inventory management

External

- 1 Government Health database
- 2 Insurance companies
- 3 Pharmaceutical Research data
- 4 Wearable Devices & Mobile Apps
- 5 Public health organizations

task 4

Ques reflect on how adopting a data-driven approach can improve decision quality in daily life or business.

Adopting a data-driven approach significantly enhances the quality of decisions in both life and business.

In healthcare, it helps doctors make accurate diagnoses, reduce human errors, and predict patient outcomes with greater precision. Hospitals can allocate resources more efficiently and improve overall patient satisfaction.