Project Title

Descriptive Analysis Using Excel for Enhancing Digital Government and Economy (EDGE) Program

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Abstract

This project demonstrates the use of descriptive analysis to interpret and summarize data relevant to the Enhancing Digital Government and Economy (EDGE) program at Mawlana Bhashani Science and Technology University. Descriptive analysis is essential in data-driven fields for summarizing large datasets, discovering patterns, and making informed decisions. Using Microsoft Excel, this project covers data preparation, calculation of key statistical measures. The findings provide insights into participant engagement and performance in the EDGE program. Excel's accessibility and versatility make it a suitable tool for both beginners and advanced users in data analysis, proving invaluable for initiatives like EDGE, which aim to strengthen digital literacy and analytical skills

Chapter One: Introduction

Introduction

This report provides a descriptive analysis of inventory records to gain insights into stock levels, purchasing trends, and cost variations. The analysis covers various aspects such as opening stock, stock purchases, units sold, hand-in stock, cost price per unit, and total cost price. By analyzing these metrics, we can identify trends and make informed decisions about inventory management.

Background

The Enhancing Digital Government and Economy (EDGE) program is a government-led initiative focused on empowering students with digital skills and enhancing their understanding of digital government and economic frameworks. Conducted by the ICT Department at Mawlana Bhashani Science and Technology University, this program aims to prepare students for the data-driven demands of modern workplaces. One key component of the program is Microsoft Office, which includes Excel, widely used in data analysis, finance, and general business operations.

The EDGE program's mission aligns with the current demand for digital skills, as organizations increasingly seek professionals who can interpret and analyze data effectively. Within this context, descriptive analysis—the first step in data analysis—is essential for understanding data before diving into more complex analysis.

Importance of Descriptive Analysis

Descriptive analysis involves summarizing and interpreting data to reveal insights without drawing predictive conclusions. It includes calculating statistical measures like averages, medians, and standard deviations. For the EDGE program, descriptive analysis can help assess student progress, engagement, and areas for improvement. It also enables stakeholders to measure the program's impact, enhancing its value and relevance.

Role of Microsoft Excel in Data Analysis

Microsoft Excel is one of the most commonly used tools in data analysis due to its accessibility, ease of use, and robust features. Excel provides numerous built-in functions and visualization tools that make it ideal for descriptive analysis. It allows users to handle large datasets, perform complex calculations, and generate a range of charts to visually interpret data. In this project, Excel is employed to conduct descriptive analysis on sample EDGE program data, highlighting its effectiveness in analyzing and summarizing participant performance and feedback.

Objectives of the Project

The main objectives of this project are:

- To explore the use of Excel in conducting descriptive analysis, particularly for data related to the EDGE program.
- To apply key statistical functions in Excel, including measures of central tendency and dispersion.
- To summarize findings that could inform decisions in program planning and enhancement.
- To build proficiency in using Excel as a data analysis tool for academic and professional purposes.

Tools and Software

Microsoft Excel:

Microsoft Excel is the primary tool used in this project. Its functions for statistical

calculations (e.g., AVERAGE, STDEV, MEDIAN) allow for efficient computation of key descriptive statistics. The accessibility and versatility of Excel make it an ideal choice for this analysis, supporting both fundamental and advanced data analysis tasks.

Chapter Two: Methodology

Data Collection and Sample Data

The dataset contains 46 entries for each variable, and we performed descriptive analysis using metrics such as mean, median, mode, standard deviation, skewness, and kurtosis. The following sections summarize the key findings for each variable.

Data Cleaning and Preparation

Before conducting descriptive analysis, data cleaning is essential to ensure accuracy. This involves:

Checking for Missing Values: Use Excel's "Conditional Formatting"or "Filter" options to locate and address missing data. Missing values can be replaced with the mean or median if they are relatively few, or removed if necessary.

Removing Duplicates: Duplicates can distort analysis results. Use "Data > Remove Duplicates" to eliminate any repeat entries.

"Outlier Detection": Outliers can skew descriptive statistics. To identify outliers, calculate measures like the interquartile range (IQR) and mark values that fall significantly above or below typical values.

Chapter Three: Case

Study/ExampleDataset and Analysis

Stage 1: Open the Dataset

- Step 1: Open "Inventory-Records-Sample-Data.xlsx" in Excel.
- Step 2: Take a moment to examine the column headers and familiarize yourself with the types of data available (e.g., Product ID, Product Name, Price, Quantity in Stock, Sales).

By understanding what each column represents, you'll know which statistical metrics are most meaningful for analysis (e.g., Price for cost analysis, Quantity for stock analysis).

Stage 2: Perform Descriptive Statistics Analysis

Using Excel's Built-In Analysis ToolPak:

If you have Excel's Data Analysis ToolPak enabled, this tool can quickly provide key summary statistics:

1. Enable Data Analysis ToolPak (if not already enabled):
    - Go to File > Options > Add-Ins.
    - In the Manage box, select "Excel Add-ins," then click Go.
    - Check "Analysis ToolPak" and click OK.
2. Run Descriptive Statistics:
    - Go to the Data tab and select Data Analysis.
    - Choose Descriptive Statistics from the list and click OK.
    - Input Range: Select the data range for the column you want to analyze (e.g., Prices, Quantities, or Sales).
    - Output Range: Choose where in the sheet you want the results displayed.
    - Check the box labeled Summary Statistics and then click OK.

    For each selected column, you'll receive:

    - Mean (average): Central tendency of the values.

- Median: The midpoint value, which can show skewness.
- Mode: The most frequently occurring value.
- Standard Deviation: Indicates data spread or variability.
- Minimum and Maximum: Range of values.

Opening Stock		*Purchase/ Stock in*		*Number of Units Sold*		*Hand-In-Stock*
Mean	35.97826087	Mean	15.36956522	Mean	6.826086957	Mean
Standard Error	1.926296321	Standard Error	0.888117314	Standard Error	0.571720302	Standard Error
Median	35	Median	15	Median	6	Median
Mode	40	Mode	15	Mode	3	Mode
Standard Deviation	13.0647773	Standard Deviation	6.023504685	Standard Deviation	3.877595749	Standard Deviation
Sample Variance	170.6884058	Sample Variance	36.2826087	Sample Variance	15.03574879	Sample Variance
Kurtosis	-0.201505809	Kurtosis	-0.158556525	Kurtosis	1.832574362	Kurtosis
Skewness	0.589036089	Skewness	0.596836414	Skewness	1.261286596	Skewness
Range	55	Range	24	Range	18	Range
Minimum	15	Minimum	6	Minimum	2	Minimum
Maximum	70	Maximum	30	Maximum	20	Maximum
Sum	1655	Sum	707	Sum	314	Sum
Count	46	Count	46	Count	46	Count

For this project, a hypothetical dataset representing EDGE program participant data was analyzed:

Dataset Overview: The dataset contains product ID, product name, opening Stock, purchase/
stock in number of units sold hand-in-stock, cost price per unit (usd), cost price total (usd). These variables capture various aspects of the elements impact.

Findings and Interpretations

☒ Opening Stock

- **Mean**: 35.98, indicating an average opening stock of 36 units.
- **Median**: 35, which is close to the mean, suggesting a fairly symmetrical distribution.
- **Mode**: 40, indicating 40 units was the most frequent opening stock.
- **Range**: 55, with a minimum of 15 and maximum of 70.
- **Skewness**: 0.59, showing a slight positive skew, meaning most values are

clustered below the mean with a few higher values.

- **Interpretation**: The opening stock distribution is relatively symmetrical, with a moderate concentration around 36 units. The slight positive skew suggests occasional higher stock values, but these are not overly extreme.

Purchases / Stock In

- **Mean**: 15.37, representing the average number of units purchased.
- **Median**: 15, indicating a balanced distribution around the mean.
- **Mode**: 15, showing that 15 units is also the most common purchase quantity.
- **Range**: 24, with values ranging from 6 to 30 units.
- **Skewness**: 0.60, showing a moderate positive skew.
- **Interpretation**: Purchases are consistent, typically around 15 units, with some variation. The positive skew hints at occasional higher purchase quantities.

Number of Units Sold

- **Mean**: 6.83, which is relatively low compared to stock levels.
- **Median**: 6, closely matching the mean, suggesting symmetry.
- **Mode**: 3, indicating that selling three units is common.
- **Range**: 18, with a minimum of 2 and a maximum of 20.
- **Skewness**: 1.26, a higher positive skew, indicating a concentration of lower sales values.
- **Interpretation**: Most sales are for fewer units, as indicated by the low mean and median. The high skewness points to occasional larger sales, but these are rare.

Hand-In-Stock

- **Mean**: 43.57, suggesting that, on average, 44 units remain in stock.
- **Median**: 41, close to the mean, indicating relative symmetry.
- **Mode**: 50, the most common stock remaining.
- **Range**: 63, with stock levels ranging from 17 to 80 units.
- **Skewness**: 0.43, suggesting a slight positive skew.
- **Interpretation**: Inventory levels are typically around 44 units. The slight skew suggests occasional higher stock levels, but most values are close to the mean.

Cost Price Per Unit (USD)

- **Mean**: $155.78, indicating the average cost per unit.
- **Median**: $60, lower than the mean, suggesting a distribution skewed to higher values.
- **Mode**: $80, the most frequently observed cost.
- **Range**: 1195, with values between $5 and $1200.
- **Skewness**: 2.69, indicating a significant positive skew.
- **Interpretation**: There's a wide range of unit costs, with the majority of values on the lower end but some extremely high outliers. This skew may affect total inventory costs.

Cost Price Total (USD)

- **Mean**: $7820.87, indicating the average total cost of inventory items.
- **Median**: $3000, which is much lower than the mean, highlighting the influence of outliers.
- **Mode**: $72,000, the highest frequency total cost.
- **Range**: 71,855, with totals ranging from $145 to $72,000.
- **Skewness**: 3.31, a high positive skew, meaning some items have a significantly higher total cost.
- **Interpretation**: The extreme skew and high variance suggest a few items with very high costs are pulling up the average total cost, potentially influencing budgeting and purchasing decisions.

Chapter Four : Data validation and macros

Process of the Project Work:

1. Set Up the Registration Form Layout
Design the form with input fields in designated cells like Name, Email, Phone Number, Date of Birth, etc.
2. Apply Data Validation Rules
Name: Use Text Length data validation to limit character length if needed.
Email: Use Custom Formula for format validation (e.g., ensuring "@" and ".com").
Phone Number: Set to allow only Whole Number entries within a specific range if necessary (e.g., 10 digits).
Date of Birth: Use Date validation to allow dates within a reasonable range (e.g., from 1900 to the current year).
3. Create a Dropdown List (if needed)
For fields like Country or Gender, create a list of predefined options in a separate worksheet or section of the form.
Use Data Validation > List to connect the input cell to this list, allowing users to select from the options.
4. Record a Macro for Submission
Go to Developer > Record Macro to begin recording.
Enter data in fields (if not already done) to capture steps.
Save Input Data: Write a script or record copying entered data to a database sheet or table to store each submission.
Clear Form: Record steps to clear input fields after data is saved, preparing the form for the next user.
Stop Recording the macro.
5. Assign the Macro to a Button
Insert a button (from Developer > Insert > Button).
Assign the recorded submission macro to the button so users can click to submit their entry.
6. Test the Form and Automation
Test the form to ensure data validation works correctly and errors are prompted as needed.
Test the macro by filling out the form, clicking the button, and checking if data is saved properly and fields are cleared.
7. Protect the Form (Optional)
Lock cells containing formulas or validation rules to prevent accidental edits by users.
Use Protect Sheet options to restrict changes to specific areas only.
This approach ensures a clean, automated registration process that enforces data standards and reduces manual effort in processing entries.

Steps to Automate a Registration Form in Excel with Data Validation and Macros:

1 . Create the Form Layout: Set up fields like Name, Email, Phone Number, etc.

2. Apply Data Validation:

a) Set rules for each field (e.g., text length for Name, custom formula for Email, number validation for Phone Number, date range for Date of Birth).
b) Use dropdown lists for fields like Gender or Country if needed.

3. Record Submission Macro:

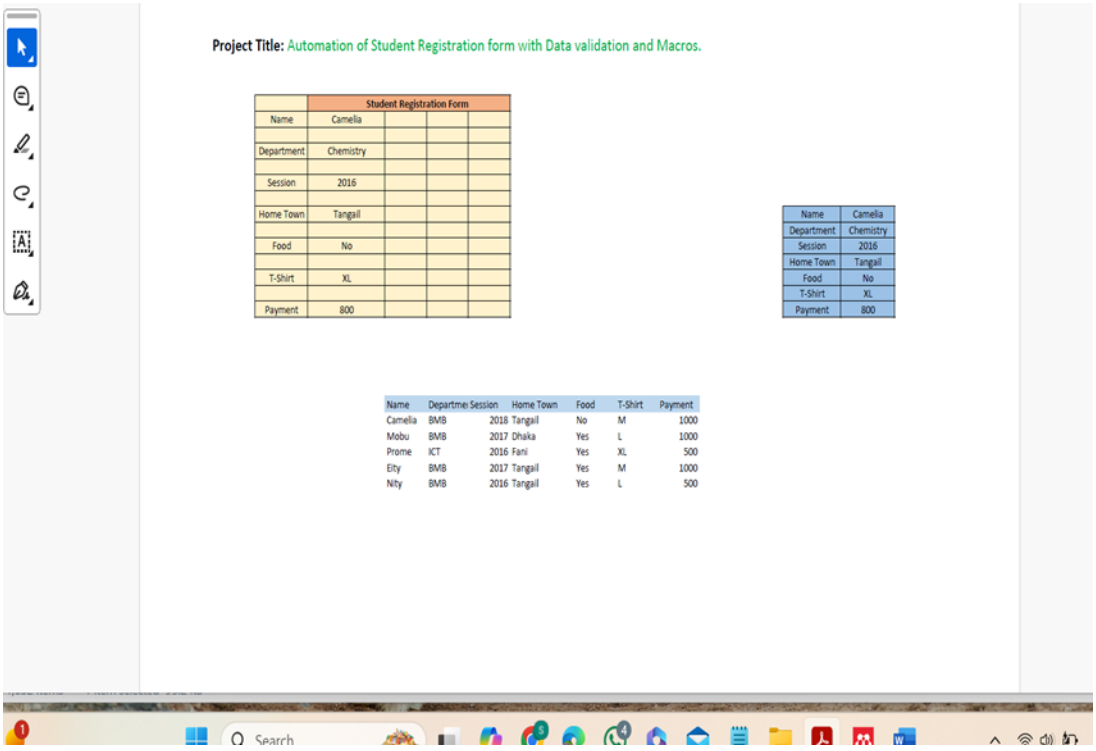
a) Start recording a macro that copies entered data to a separate sheet (database).
b) Clear form fields after saving the data, then stop recording.

4) Assign Macro to Button: Add a button to the form and link it to the submission macro.

5) Test and Protect Form: Check that validation works, the macro saves data, and form fields clear after submission. Lock cells if necessary to prevent unwanted edits.

This setup automates form entries, validates data, and stores submissions efficiently.

Results of this Automation process of registration form:



The automation of a registration form in Excel with data validation and macros brings several key benefits. It significantly improves data accuracy by ensuring that only valid inputs are entered, such as correctly formatted emails and phone numbers. The use of macros speeds up the process, automatically saving and clearing the form after each submission, which reduces manual effort and time spent on repetitive tasks. Data consistency is also enhanced, as validation rules ensure that all entries follow the same format, making the data more reliable for analysis. Overall, this automation makes the registration process much faster, more efficient, and user-friendly, while minimizing errors and ensuring high-quality data collection.

Chapter Five: Conclusion and Recommendations

- **Stock Management**: The positive skew in the "Hand-In-Stock" data indicates occasional overstocking. We recommend adjusting purchase quantities to better match typical sales rates.
- **Cost Management**: The high skew in "Cost Price Per Unit" and "Cost Price Total" suggests that a few expensive items significantly impact overall costs. We recommend evaluating the necessity of high-cost items and exploring potential cost reduction for these items.
- **Sales Strategy**: Given the skew in "Number of Units Sold," most products sell in smaller quantities. Targeted sales efforts could encourage higher sales volumes, especially for underperforming products.

This descriptive analysis highlights the need for balanced inventory management, cost control, and sales optimization to maintain efficiency and profitability. Further analysis could focus on monthly or seasonal trends to refine inventory and purchasing strategies.