Symbiosis Institute of Technology, Pune

Artificial Intelligence and Machine Learning

M. Tech 2023-25 Batch

CA2: Dashboard Project Synopsis

Title: Region-Wise Cost Analysis and Visualization of IT Departments

Goals/Objective:

1. Cost Analysis and Optimization
   Analyze the IT department's cost structure across different regions and Optimize IT expenses to improve cost efficiency.
2. Budget Allocation
   Provide insights to inform budget allocation decisions.
3. Department Efficiency
   Evaluate IT department efficiency by analyzing resource allocation and project management.
4. Predictive Analytics
   Develop predictive models to forecast IT costs and performance trends.

Dataset:
A cost analysis dataset of region-wise different IT departments.

A. Use Cases

1. IT Trends and Forecasting :
   Analyze trends in IT spending, technology adoption, and emerging technologies to make informed decisions about future IT investments.
2. Comprehensive Reporting
   Generate comprehensive reports for IT department heads and executives to support informed decision-making.
3. Business Continuity Planning
   Develop business continuity and disaster recovery plans for IT operations in different regions.
4. Vendor Analysis
   Analyze costs associated with different vendors and service providers to optimize vendor relationships and contracts.

B. Tables Description

Table 1: Cost Elements

Cost Element	Cost Element Group	Business Area
External Labor	Labor	BU
Internal Labor	Labor	BU
Employee Performance	Other	BU
Other	Other	BU
Recognition	Other	BU
Training	Other	BU
Travel	Other	BU
Administrative	Administrative	R&D
Amortization	Depr & Amort	R&D

Business Area	Text	The business area or division within the organization to which the cost element is assigned
Cost Element	Text	The specific cost element identifier or code
Cost Element Group	Text	The group or category to which the cost element belongs

Table 2: Departments

IT Department	IT Area	Dept. Manager
Core	BU Support	Sam Danks
Development	BU Support	Sam Danks
Distribution	BU Support	Linda Lee
Emerging	BU Support	Robert Nero
Manufacturing	BU Support	Mira Flores
Planning	BU Support	Mira Flores

IT Department	Text	identifier of the IT departmen
IT Area	Text	The specific area or sub-division within the IT department
Dept. Manager	Text	The name of the department manager.

Table 3 : Regions

Country	Region
Austria	Europe
Belgium	Europe
Brazil	Latin America
Canada	Canada

Country	Text	country to which a region belongs.
Region	Text	identifier of a specific region within the country.

Table 4 : Forecast

Date	IT Dep.	CostElement	Country	Forecast
01 January 2020	Administration	Internal Labor	USA	90,994
02 January 2020	Administration	Internal Labor	USA	1,03,135
03 January 2020	Administration	Internal Labor	USA	1,16,809
04 January 2020	Administration	Internal Labor	USA	92,221
05 January 2020	Administration	Internal Labor	USA	1,26,128
06 January 2020	Administration	Internal Labor	USA	95,333

Cost Element	Text	
Country	Text	
Date	Date	
Forecast	Numeric	
IT Dept	Text	

Table 5: Actuals

Date	IT Department	Cost Element	Country	Actual
01 January 2020	Administration	Internal Labor	USA	90,994
01 January 2020	Architecture	Internal Labor	USA	41,537
01 January 2020	Business Intelligence	Internal Labor	USA	64,388
01 January 2020	Core	Internal Labor	USA	20,476
01 January 2020	Core Infrastructure	Internal Labor	USA	55,695
01 January 2020	Data Centers	Internal Labor	USA	1,38,204
01 January 2020	Development	Internal Labor	USA	1,49,259

Cost Element	Text	
Country	Text	
Date	date	
Actual	Numeric	
IT Dept	Text	

Table 6: Budget

Date	IT Dep.	CostElement	Country	Budget
01 January 2020	Business Intelligence	Hardware Maintenance	USA	125
02 January 2020	Business Intelligence	Hardware Maintenance	USA	125
03 January 2020	Business Intelligence	Hardware Maintenance	USA	125
04 January 2020	Business Intelligence	Hardware Maintenance	USA	125
05 January 2020	Business Intelligence	Hardware Maintenance	USA	125
06 January 2020	Business Intelligence	Hardware Maintenance	USA	125
07 January 2020	Business Intelligence	Hardware Maintenance	USA	125

Cost Element	Text	identifier or code to which the actual data pertains
Country	Text	name of the country for which the actuals are recorded
Budget	Numeric	allocated budget
Date	Date	date to which the budget corresponds
IT Dept	Text	IT department for which the budget is assigned

C. Types of Files

The data files are in the CSV format

Preprocessing:

1. Data Integration:
   Combine and integrate data from multiple tables to create a unified dataset.(Here , Cost Element, Country, Date, IT Dept).
2. Column Renaming:
   Rename columns to ensure clarity in naming conventions
3. Encoding Categorical Variables:
   Encode categorical variables into numerical formats using techniques like one-hot encoding or label encoding for columns like 'Country,' 'IT Dept,' 'Cost Element Group,' etc.
4. Handling Duplicates:
   Removes duplicate records in the dataset.
5. Data Hierarchies:
   Create hierarchies for time-related columns, such as Year-Month-Date, for more advanced time-based analysis and reporting.

Measures/KPIs:

1. IT Department with the Largest Budget Variance
   Identifies the IT department with the largest budget variance with MAXX

2. Yearly Actual Costs by Country
   Calculates the total actual costs by country for the entire year with SUMX

3. Country with the Highest Budget Utilization
   Identifies the country with the highest budget utilization with MAXX and DIVIDE

4. Monthly Forecasted Costs
   Provides the sum of forecasted costs for a specific month with SUM

5. Total Budget by IT Department
   Calculates the total budget for each IT department with CALCULATE

6. Month-to-Date (MTD) Forecast Variance
   Calculates the month-to-date budget variance by considering the selected month and date filter in the 'Budget' table with CALCULATE and DATESMTD

7. Average Monthly Budget Utilization
   Computes the average monthly budget utilization for the year-to-date (YTD) period with AVERAGE and DATESYTD

8. Average Actual Cost per IT Department
   Computes the average actual cost per IT department with AVERAGEX

9. Actual Costs vs. Forecasted Costs by IT Department
   Compares actual costs to forecasted costs for each IT with DIVIDE, CALCULATE, and ALL.

10. Year-to-Date (YTD) Actual Costs
    Calculates the year-to-date actual costs, considering the selected year with CALCULATE and DATESYTD.

11. Budget Allocation by IT Area
    Summarizes the budget allocation by IT area with SUMX

12. Budget Utilization Percentage:
    Calculates the percentage of the budget utilized by IT departments with DIVIDE.

Visuals/Graphs

1. Donut Chart for Cost Element Breakdown
   A donut chart illustrating the breakdown of costs by cost element, providing insights into the composition of expenses.

2. Area Chart for Year-to-Date (YTD) Budget Utilization Trend
   An area chart displaying the trend of YTD budget utilization across all departments, indicating whether budgets are being spent as planned.

3. Heatmap for Budget Variance by IT Department and Month
   A heatmap highlighting budget variances by IT department and month, enabling you to identify departments with significant deviations.

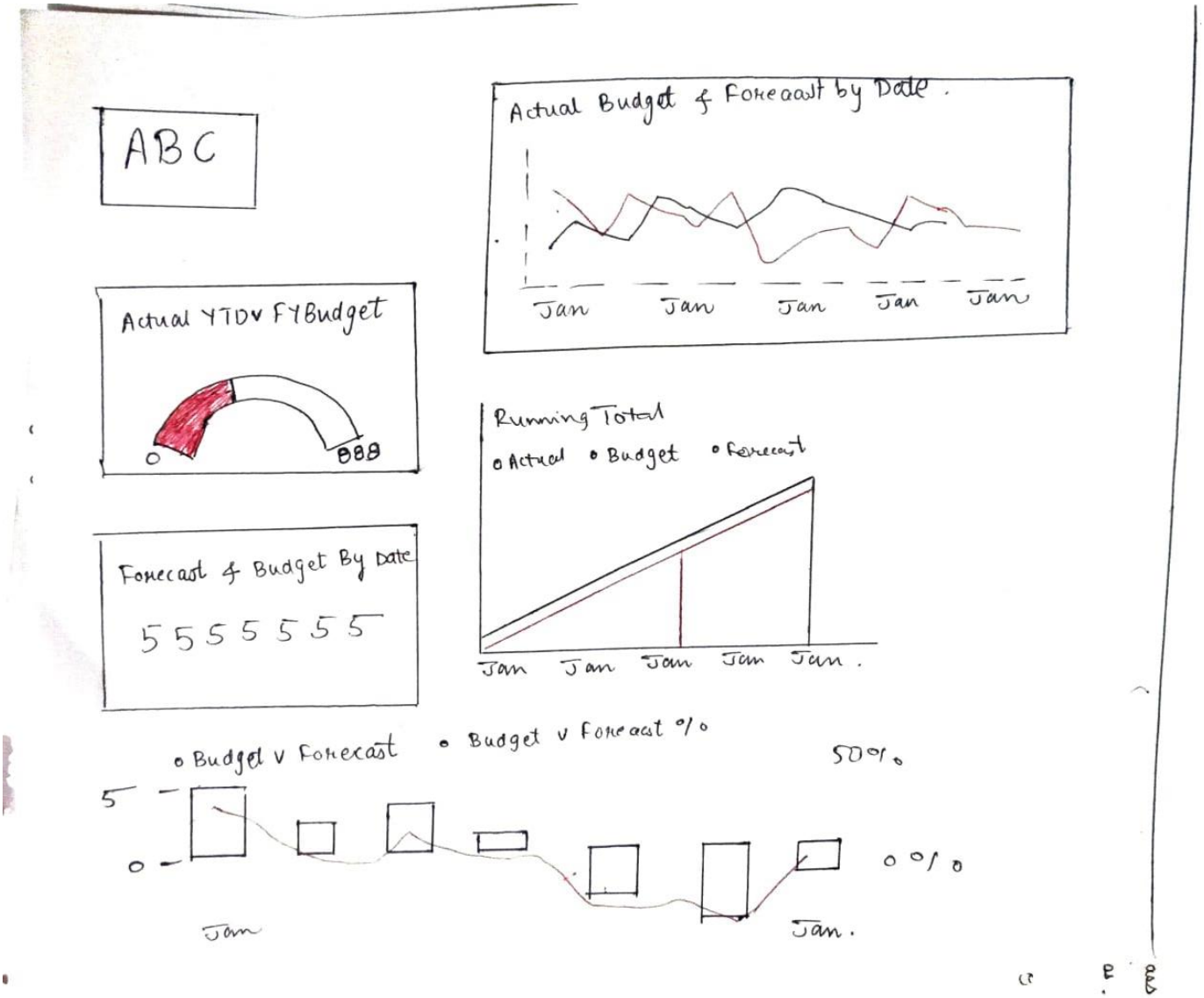
4. Scatter Plot for IT Department vs. Actual Costs
   A scatter plot showing the relationship between IT departments and actual costs, revealing which departments incur higher expenses.

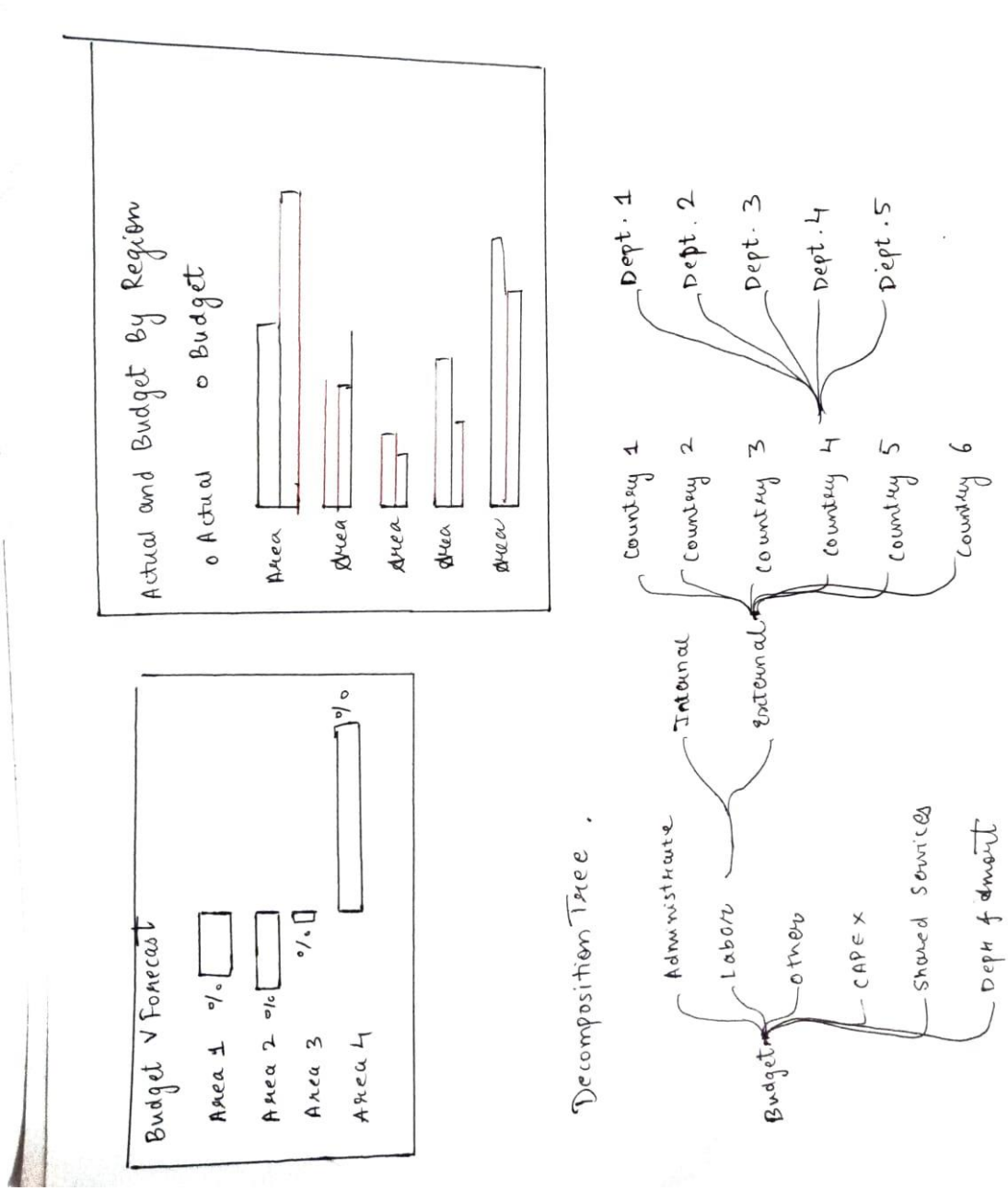
5. Tree Map for Budget Utilization by Country and IT Area
   A tree map visualizing budget utilization across countries and IT areas, aiding in identifying regions and IT areas with budget surpluses or deficits
6. Pie Chart for Actual Costs vs. Forecasted Costs Breakdown
   A pie chart representing the proportion of actual costs compared to forecasted costs, offering a clear view of budget accuracy.

7. Stacked Column Chart for Quarterly Budget Utilization
   A stacked column chart demonstrating budget utilization by quarter, allowing you to

assess performance by quarter.

Sketch/rough pictorial plan of the dashboard:





References:

1. https://www.kaggle.com/ - This data has been acquired from Kaggle.
2. https://learn.microsoft.com/en-us/dax/
3. https://learn.microsoft.com/en-us/power-bi/visuals/power-bi-visualization-scatter?tabs=powerbi-desktop
4. https://learn.microsoft.com/en-us/power-bi/visuals/power-bi-visualization-tables?tabs=powerbi-desktop