Business Analytics Model Results Communication

Title: E.ON Sales Analysis and Business Insights

Subtitle: A Data-Driven Approach to Enhance Decision-Making

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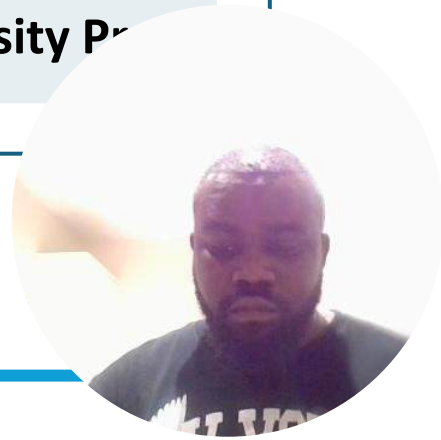
Nexford University Pr



INTRODUCTION

Overview:

The purpose of this analysis is to provide insights that will help in improving sales forecasting and understanding our customer behavior. By analyzing the historical sales data, we aim to identify trends of the market, assess product performance, and examine customer purchasing patterns, which can help us in better decision-making.

Dataset:

The dataset we will be using for this analysis is the E.ON Sales Data. It contains several key variables such as

Customer Names: Help to identify our customers

Product Lines: Categories of products being sold.

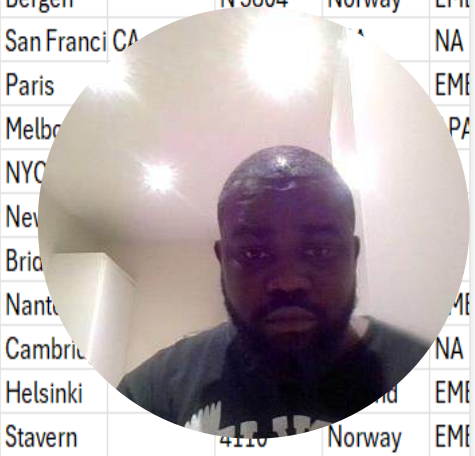
Order Dates: The dates when orders were placed.

Sales Amounts: The total sales of revenue by Product Category(Line).

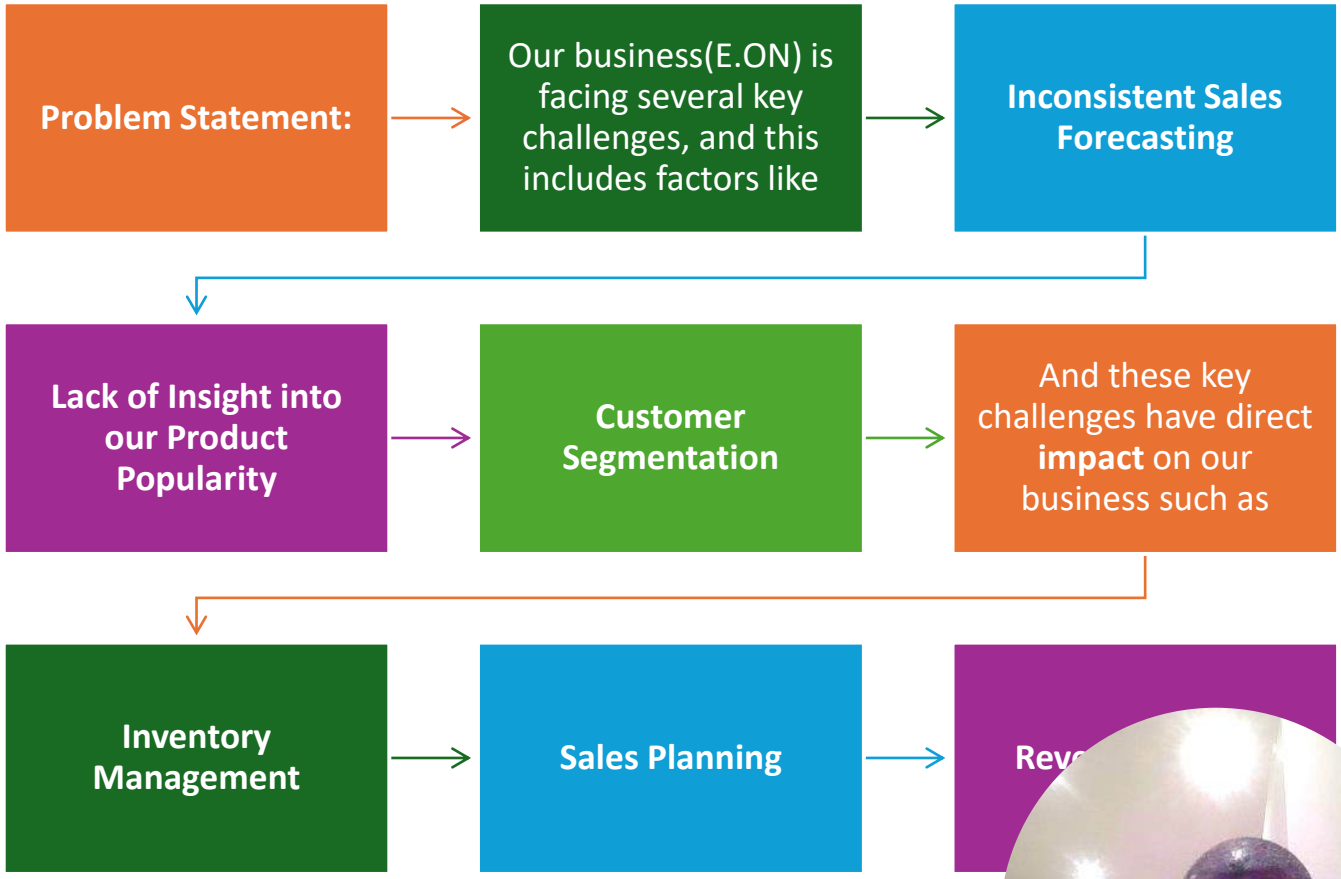
E.ON DATA

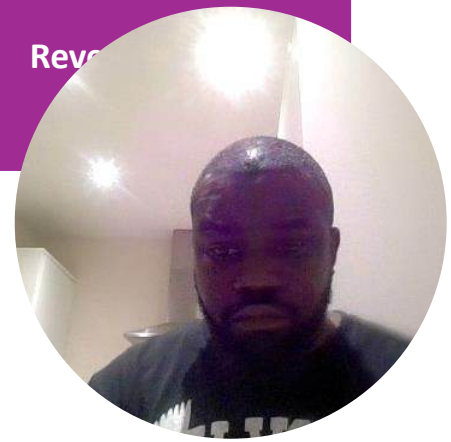
SNIPPET OF THE DATASET

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
1	ORDERI	QUANT	PRICEE	ORDERLINENUMBER	SALES	ORDERDATE	MONTH	YEAR_ID	PRODUCTLIN	MSRP	PRODU	CUSTOMERNAI	PHONE	ADDRES	ADDRES	CITY	STATE	POSTAL	COUNT	TER
2	10107	30	£95.70	2	£2,871.00	2/24/2003	2	2003	Motorcycles	95	S10_1678	Land of Toys Inc.	2125557818	897 Long Airport Aveni		NYC	NY	10022	USA	NA
3	10121	34	£81.35	5	£2,765.90	05/07/2003	5	2003	Motorcycles	95	S10_1678	Reims Collectable	26.47.1555	59 rue de l'Abbaye		Reims		51100	France	EME
4	10134	41	£94.74	2	£3,884.34	07/01/2003	7	2003	Motorcycles	95	S10_1678	Lyon Souveniers	+33 1 46 62 7555	27 rue du Colonel Pier		Paris		75508	France	EME
5	10145	45	£83.26	6	£3,746.70	8/25/2003	8	2003	Motorcycles	95	S10_1678	Toys4GrownUps.c	6265557265	78934 Hillside Dr.		Pasadena	CA	90003	USA	NA
6	10159	49	£100.00	14	£5,205.27	10/10/2003	10	2003	Motorcycles	95	S10_1678	Corporate Gift Idea	6505551386	7734 Strong St.		San Franci	CA		USA	NA
7	10168	36	£96.66	1	£3,479.76	10/28/2003	10	2003	Motorcycles	95	S10_1678	Technics Stores In	6505556809	9408 Furth Circle		Burlingam	CA	94217	USA	NA
8	10180	29	£86.13	9	£2,497.77	11/11/2003	11	2003	Motorcycles	95	S10_1678	Daedalus Designs	20.16.1555	184, chausse de Tourr		Lille		59000	France	EME
9	10188	48	£100.00	1	£5,512.32	11/18/2003	11	2003	Motorcycles	95	S10_1678	Herkku Gifts	+47 2267 3215	Drammen 121, PR 744		Bergen		N 5804	Norway	EME
10	10201	22	£98.57	2	£2,168.54	12/01/2003	12	2003	Motorcycles	95	S10_1678	Mini Wheels Co.	6505555787	5557 North Pendale S		San Franci	CA			NA
11	10211	41	£100.00	14	£4,708.44	1/15/2004	1	2004	Motorcycles	95	S10_1678	Auto Canal Petit	(1) 47.55.6555	25, rue Lauriston		Paris				EME
12	10223	37	£100.00	1	£3,965.66	2/20/2004	2	2004	Motorcycles	95	S10_1678	Australian Collect	03 9520 4555	636 St Kilda	Level 3	Melbo				PA
13	10237	23	£100.00	7	£2,333.12	04/05/2004	4	2004	Motorcycles	95	S10_1678	Vitachrome Inc.	2125551500	2678 Kings	Suite 101	NYC				
14	10251	28	£100.00	2	£3,188.64	5/18/2004	5	2004	Motorcycles	95	S10_1678	Tekni Collectables	2015559350	7476 Moss Rd.		Ne				
15	10263	34	£100.00	2	£3,676.76	6/28/2004	6	2004	Motorcycles	95	S10_1678	Gift Depot Inc.	2035552570	25593 South Bay Ln.		Bric				
16	10275	45	£92.83	1	£4,177.35	7/23/2004	7	2004	Motorcycles	95	S10_1678	La Rochelle Gifts	40.67.8555	67, rue des Cinquante		Nant				ME
17	10285	36	£100.00	6	£4,099.68	8/27/2004	8	2004	Motorcycles	95	S10_1678	Marta's Replicas C	6175558555	39323 Spinnaker Dr.		Cambri				NA
18	10299	23	£100.00	9	£2,597.39	9/30/2004	9	2004	Motorcycles	95	S10_1678	Toys of Finland, Co	90-224 8555	Keskuskatu 45		Helsinki				EME
19	10309	41	£100.00	5	£4,394.38	10/15/2004	10	2004	Motorcycles	95	S10_1678	Baane Mini Import	07-98 9555	Erling Skakkes gate 78		Stavern		4110	Norway	EME



BUSINESS PROBLEM





OUR APPROACH

Approach:

According to Sahai(2023) Linear Regression help make assumptions about the relations between predictors and target variables.

Hence, we have implemented a business analytics model using Linear Regression to forecast sales and analyze key trends. This model helps address the challenges in sales forecasting and product performance insights.

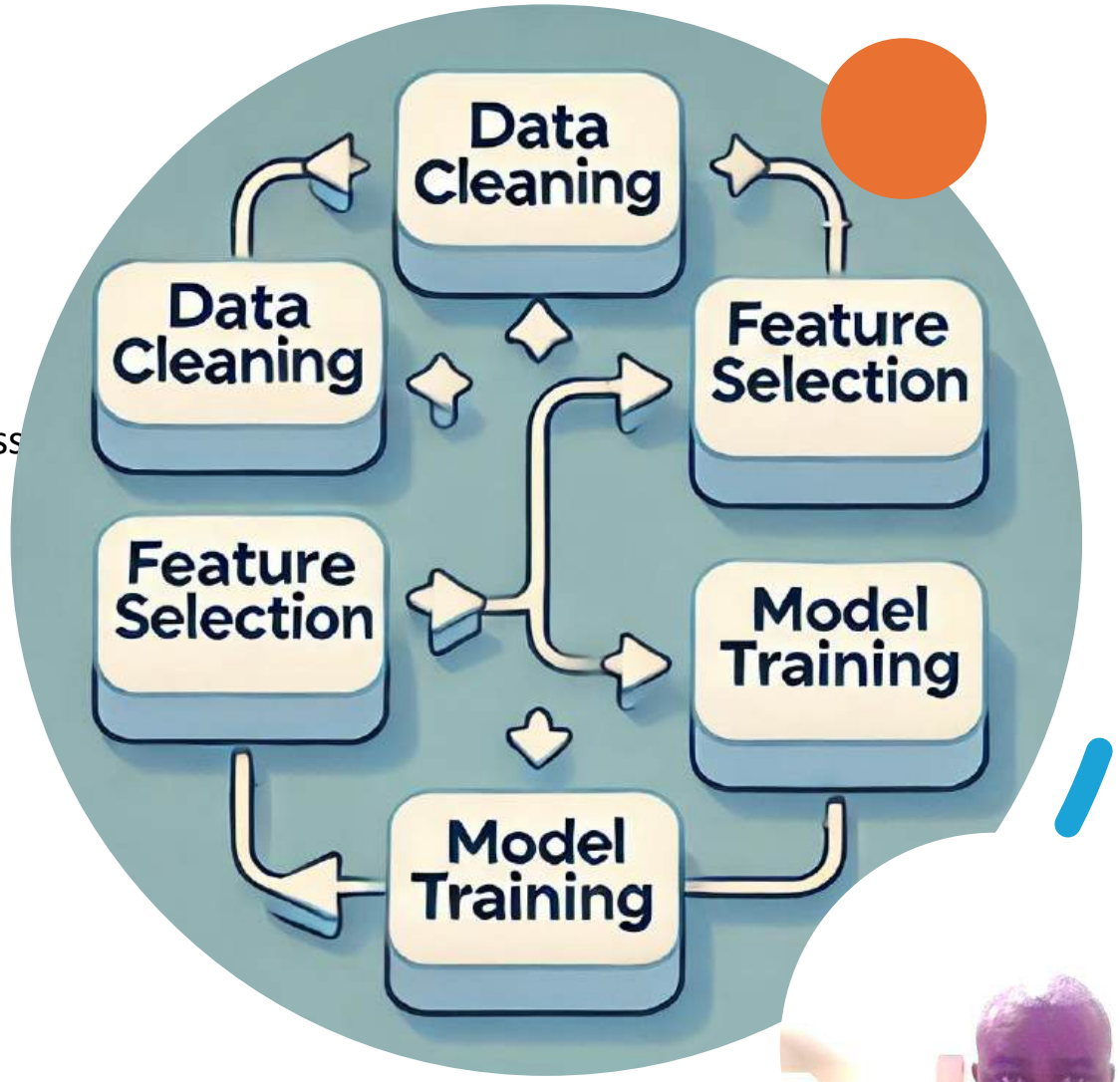
Model Development:

We will be following this step-by-step approach:

Data Cleaning: Handling missing values and we have converted dates to usable formats.

Encoding Variables: Transforming categorical data, such as customer names and product lines, into numeric values for model compatibility.

Model Training: Training the Linear Regression model using historical sales data to predict future sales.



Data Cleaning Process

Actions Taken:

Here are the steps taken to clean our data before analysis

- Handled missing values by removing or filling them.
- Removed duplicates to ensure data consistency.
- Formatted the 'ORDERDATE' column to ensure correct date format for analysis.

Exploring the Data Analysis (EDA)

Our Present findings from the exploratory analysis, shows the following Key insights

* **Sales trends over a period**

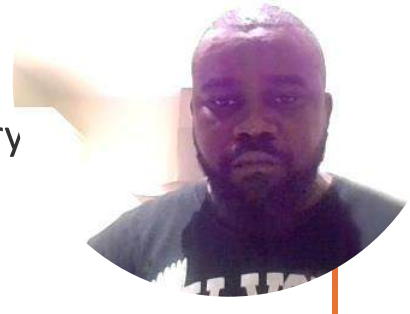
1. **Top-performing products**
2. **Top 20 customers**
3. **Top sales by country and**
4. **Deal size by country.**

Our visual includes:

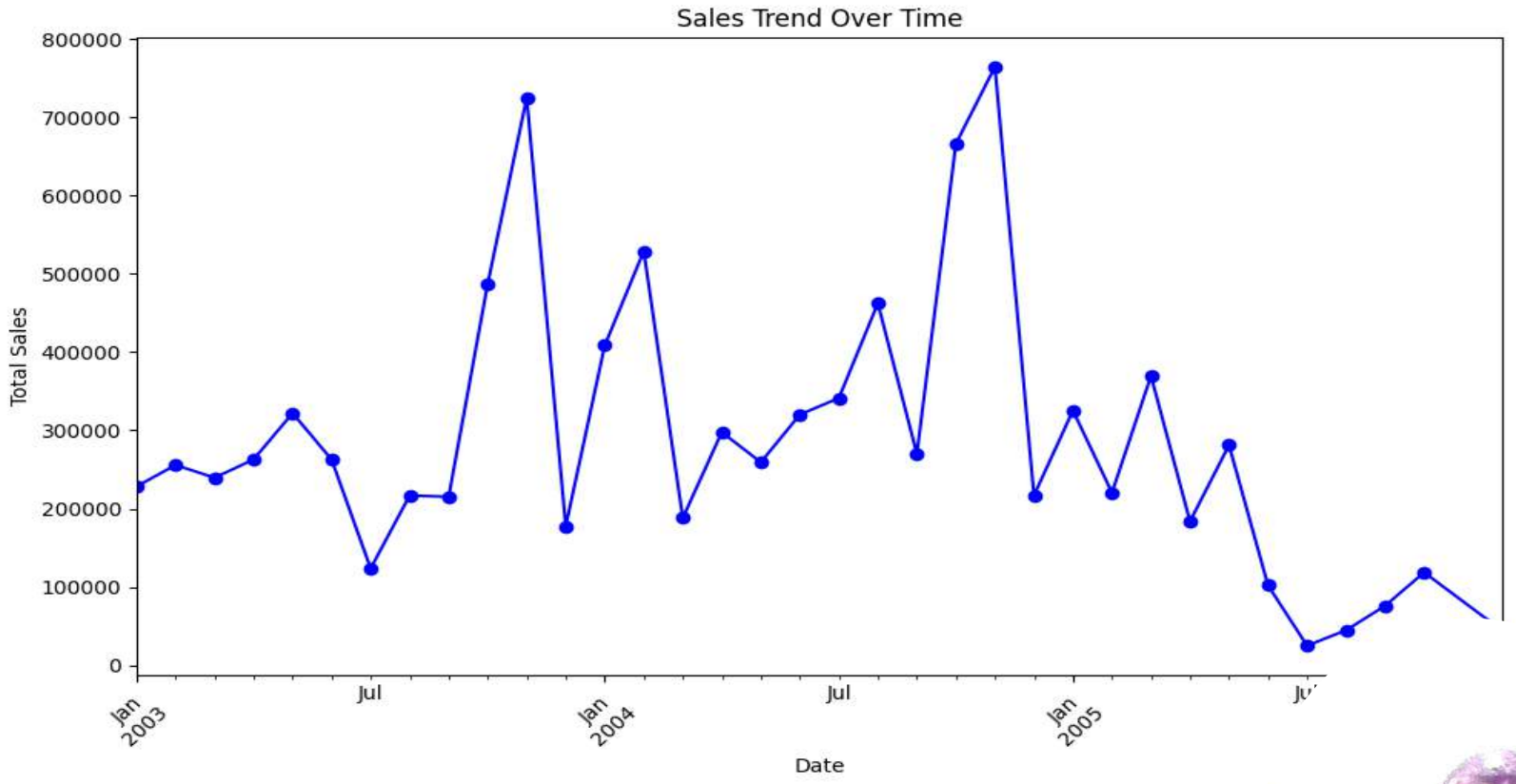
- **Line Graph**: This will display Sales trends over time
- **Bar chart** : Top-selling product lines

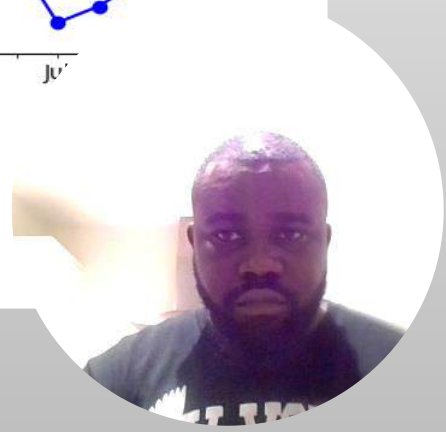
  Top 20 customers by Sales

  Sales by Country
- **Stacked Bar chart**: Deal size by Country

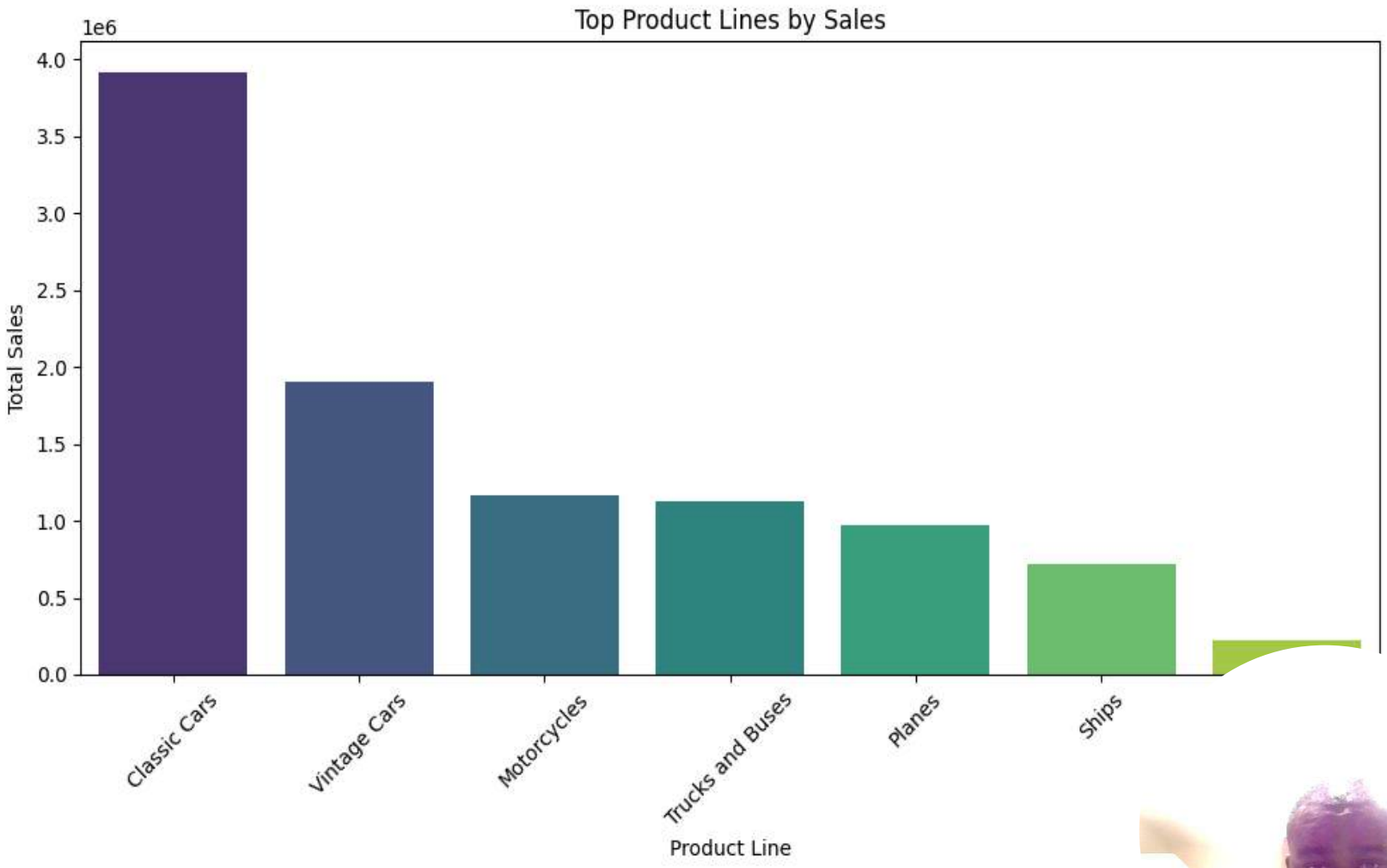


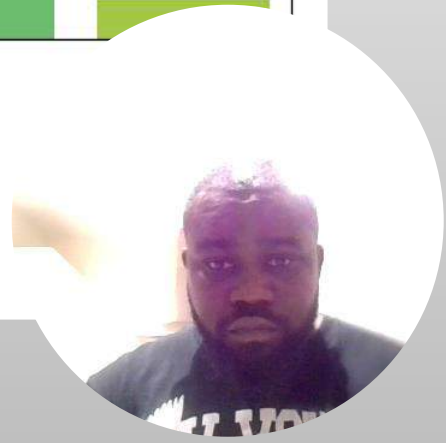
LINE GRAPH- SALES TREND OVER TIME



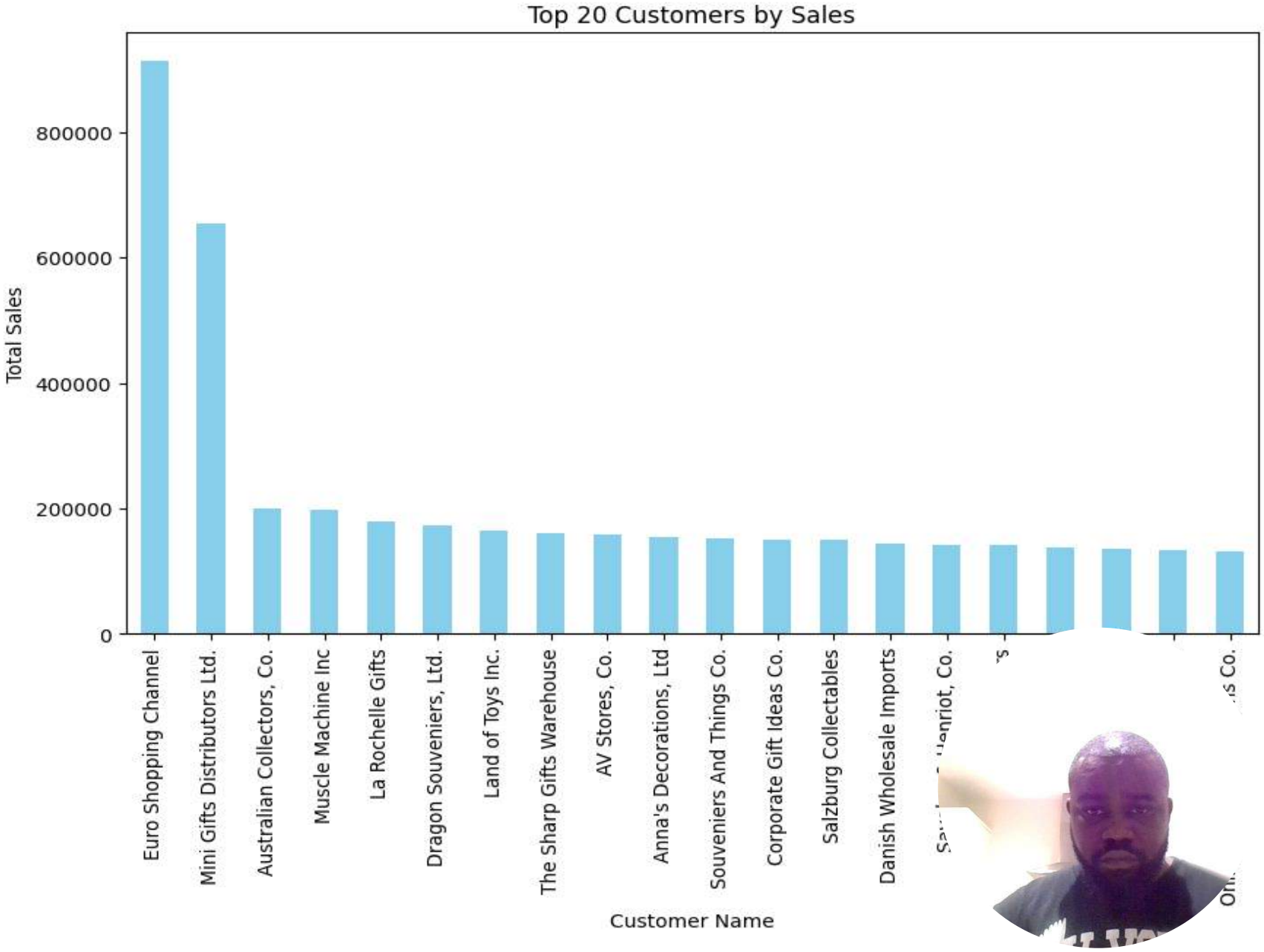


BAR CHART - TOP-PERFORMING PRODUCTS

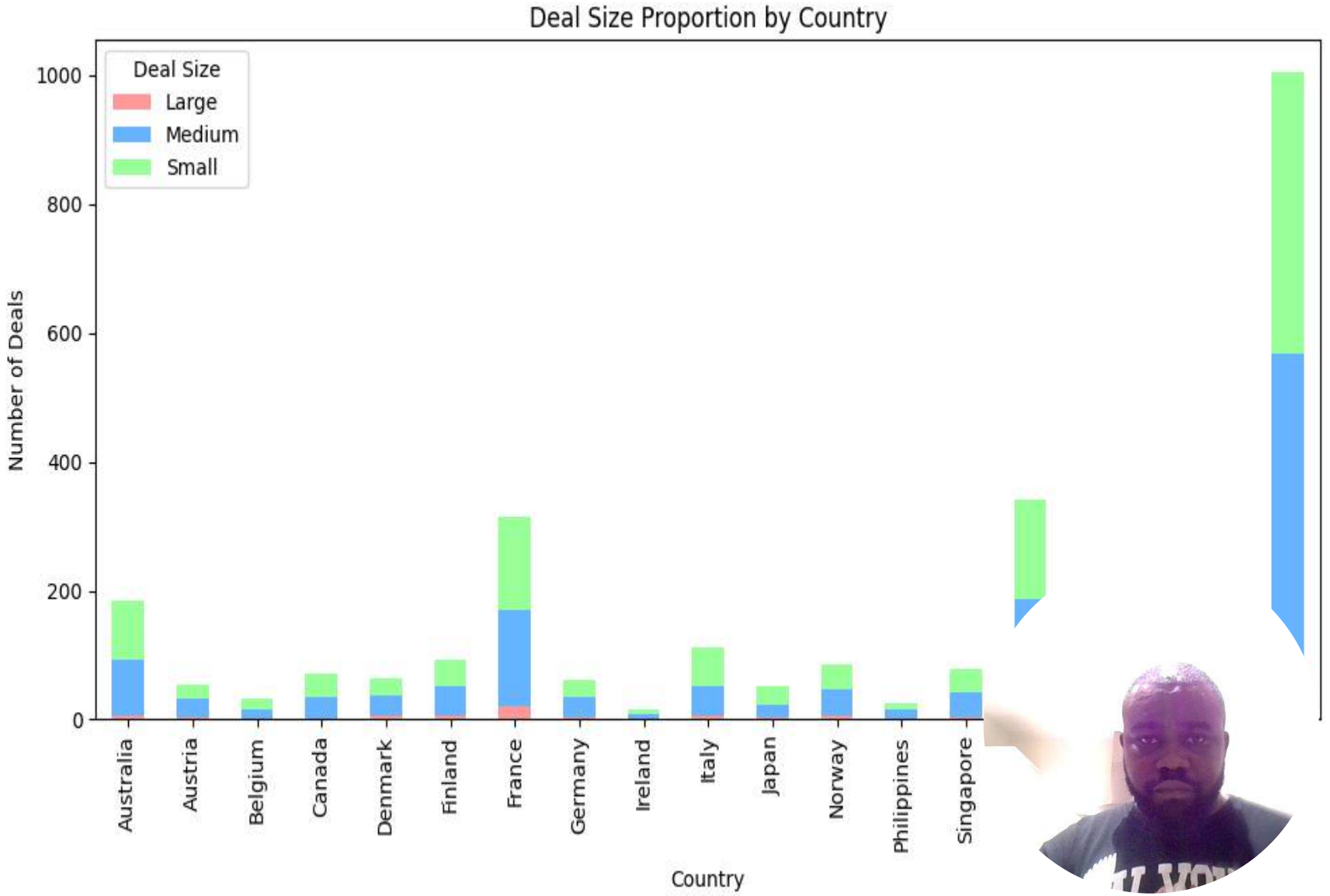




TOP 20 CUSTOMERS



DEALSIZE BY COUNTRY



Model Used and Evaluation

Model: We have used the Linear Regression model to predict sales based on customer, product, and date features. This model was chosen because "Linear-regression models are relatively simple and provide an easy-to-interpret mathematical formula that can generate predictions"(IBM, n.d). The other model considered was **Random Forest,** but **Linear Regression** provided a clear understanding of how features influenced sales predictions.

Performance Metrics:

The performance of the model was evaluated using:

Mean Squared Error (MSE): The lower value we received represent better performance and it indicate how the model fits the data.

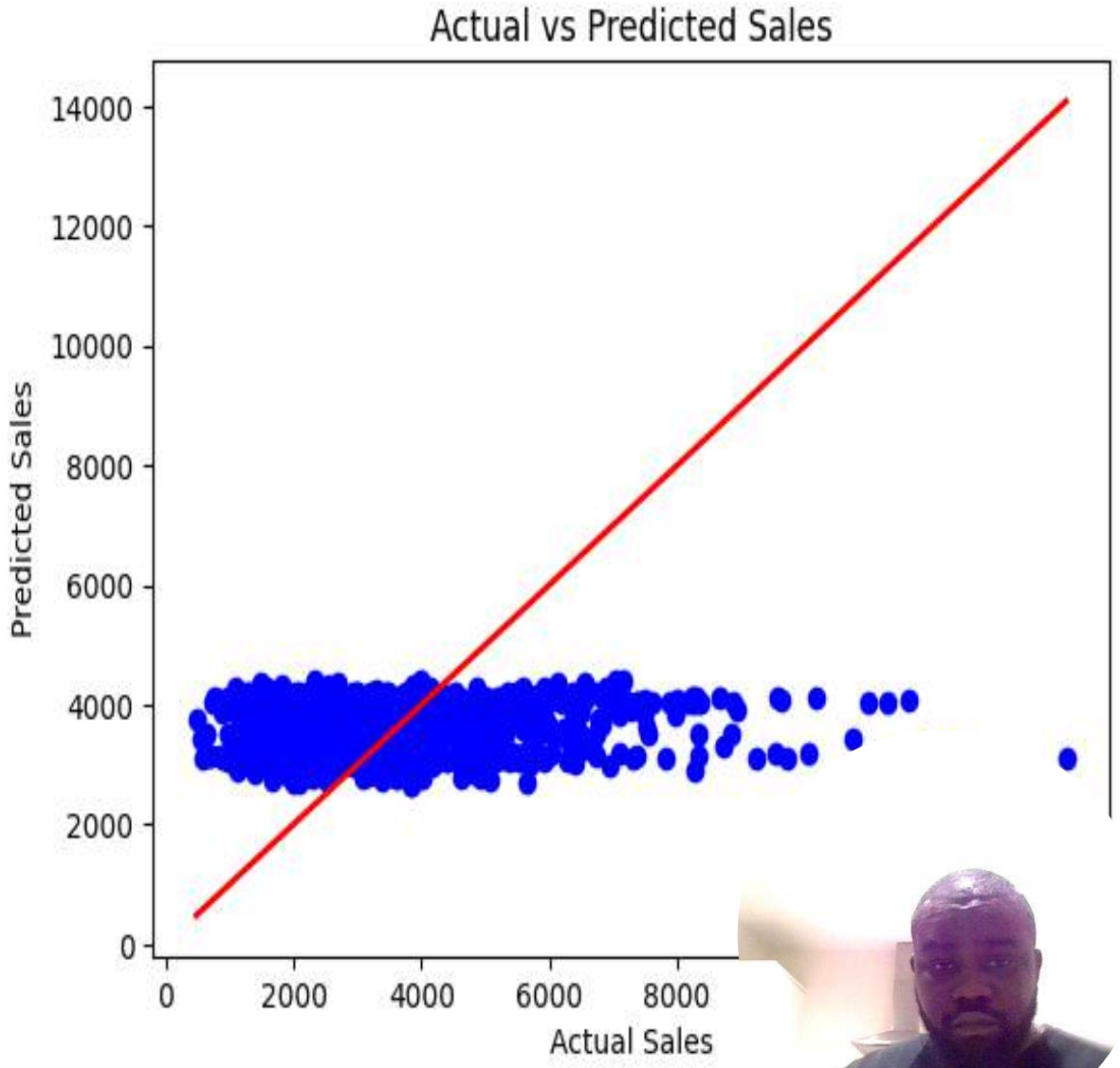
R-squared value: And this explains the proportion of variance in the sales data explained by the model having the values closer to 1 being the ideal.

MODEL PERFORMANCE/SOLUTION

We have used **Scatter Plot** to compare the **Predicted** versus **Actual** sales values to visualize the model accuracy.

The Points near the diagonal line indicates a better predictions, while points further away indicate larger errors.

This scatter plot help us to identify patterns with our predictions and showcase any errors where the model needs to improve on.



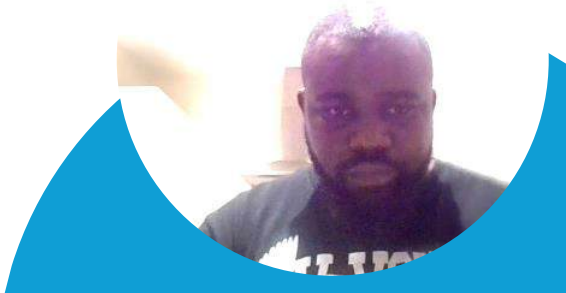
BUSINESS VALUE

The model used provides some significant business benefits by enhancing sales forecasting accuracy, helping to optimize product inventory, and enabling more informed marketing decisions.

Accurate sales predictions allow the sales team to plan better and meet targets, while improving revenue forecasts is vital for the finance team's budgeting and cash flow management.

Also, insights from customer segmentation can enable the marketing team to tailor campaigns more effectively to target different customer groups.

Overall, the model helps align business strategies across departments, leading to higher profitability and better resource allocation.



RECOMMENDATION

1. **Analyze the Spike in Early 2004:** We should Investigate the cause (product launch, marketing campaign, or seasonal effect) and replicate the strategy for the declining sales.
2. **Address the Declining Sales:** We should focus on understanding the cause of post-2004 decline (e.g., market saturation or reduced demand).
3. **Diversify Offerings or Markets:** Look into Exploring new products or markets to drive growth and counter declining sales.
4. **Focus on Top Markets:** We should Prioritize efforts in the USA and France, especially for smaller and medium-sized deals.
5. **Explore Underperforming Countries:** We should also Investigate barriers and opportunities in countries like Germany, Japan, and Italy.
6. **Deal Size Optimization:** Develop strategies to convert small deals into medium or large ones for increased revenue.
7. **Regional Customization**: Tailor strategies based on deal size trends in each country.

REFERENCES

IBM (n.d.) What is linear regression? Retrieved from https://www.ibm.com/topics/linear-regression

Sahai, N. (2023, September 6). Mastering Random Forest Regression: A Comprehensive guide. Blogs & Updates on Data Science, Business Analytics, AI Machine Learning. https://www.analytixlabs.co.in/blog/random-forest-regression