

Case Study Report: How Regression and Classification Techniques Support Business Forecasting

1. Introduction – Why the Topic Is Important

Forecasting is a critical function in business strategy. Whether predicting sales, customer churn, or inventory needs, companies rely on data-driven models to reduce uncertainty and make informed decisions. Regression and classification are two foundational techniques in machine learning that support these goals. Understanding how these models work—and when to use them—helps businesses stay competitive, efficient, and responsive to market changes.

Why this matters:

- *Enables proactive decision-making*
- *Reduces financial and operational risks*
- *Supports marketing, HR, and supply chain planning*
- *Builds confidence in data-driven strategies*
- *Connects theory with real-world business impact*

2. Concepts Covered – Related Syllabus Theory

Regression Techniques

- *Linear Regression: Predicts continuous outcomes (e.g., monthly sales, revenue)*
- *Multiple Regression: Uses multiple variables to improve accuracy*
- *Polynomial Regression: Captures non-linear trends*

- **Time Series Forecasting:** Predicts future values based on historical patterns

Classification Techniques

- **Logistic Regression:** Predicts binary outcomes (e.g., purchase/no purchase)
- **Decision Trees:** Classifies data based on feature splits
- **Random Forests:** Combines multiple trees for better accuracy
- **Support Vector Machines (SVM):** Separates data into distinct categories

Comparison Table

<u>Technique</u>	<u>Purpose</u>	<u>Output Type</u>	<u>Example Use Case</u>
Linear Regression	Predict continuous values	Numeric	Forecasting monthly revenue
Logistic Regression	Predict binary outcomes	Yes/No	Customer churn prediction
Decision Tree	Classify data	Categories	Loan approval based on profile
Time Series	Predict future trends	Numeric sequence	Demand forecasting for products

3. Real-World Examples – Company, Domain, or Event

Retail and E-commerce

- *Amazon: Uses regression to forecast demand and optimize warehouse stock.*
- *Flipkart: Applies classification to predict customer purchase behavior and personalize offers.*
- *Big Bazaar: Uses time series models to plan seasonal inventory and staffing.*

Banking and Finance

- *HDFC Bank: Applies logistic regression to assess loan eligibility.*
- *Paytm: Uses classification to detect fraudulent transactions and segment users.*

Marketing and HR

- *Zomato: Predicts customer retention using classification models.*
- *Infosys: Forecasts employee attrition using regression and decision trees.*

Diagram Suggestion

Include a dual-panel diagram:

- *Left: Regression model predicting sales over time*

- *Right: Classification model sorting customers into “High Value” and “Low Value” segments*

4. Conclusion – Lessons Learned and Ethical Implications

Lessons Learned

- *Regression and classification are essential tools for business forecasting.*
- *They help companies anticipate trends, reduce risks, and improve decision-making.*
- *Choosing the right model depends on the type of data and business goal.*
- *Accuracy improves with proper data preprocessing and feature selection.*

Ethical Implications

- ***Bias:** Models must be trained on diverse, representative data to avoid discrimination.*
- ***Transparency:** Businesses should explain how predictions are made.*
- ***Privacy:** Customer data used for modeling must be protected and anonymized.*
- ***Fairness:** Forecasts should not lead to unfair treatment or exclusion.*

Final Thought:

Forecasting is not just about numbers—it’s about responsibility. As future data scientists, we must ensure our models are accurate, ethical, and aligned with real-world needs.

If you'd like help turning these into formatted Word documents or presentation slides for your group, I can guide you step-by-step. Or we can remix them with visuals and cover pages to boost scoring impact.