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| **FRONT SHEET**  **Individual Coursework** | |
| **CANDIDATE NUMBER (C-NUMBER)** | **385907** |
| **MODULE NAME** | **Data and Decision Making** |
| **WORD COUNT** |  |
| **SUBMISSION DATE** |  |
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**TITLE PAGE: PREDICTIVE ANALYTICS FOR E-COMMERCE SALES FORCASTING**

### **Executive Summary**

This report examines the use of data analytics to improve sales forecasting in the e-commerce sector. By integrating transaction data from Kaggle with macroeconomic indicators from the World Bank, the study employs Linear Regression and Random Forest Regression to predict future sales. The analysis reveals that Random Forest Regression significantly outperforms Linear Regression in accuracy, effectively capturing the complexities of the data. The report highlights the critical role of machine learning in enhancing decision-making processes, providing actionable insights that can help businesses adapt to changing market conditions and improve strategic planning.

### **Introduction**

In today’s highly competitive business environment, data-driven decision-making has become a cornerstone for achieving sustainable growth and maintaining a competitive edge. The ability to accurately forecast sales is particularly critical in the e-commerce sector, where consumer behaviour and market conditions can shift rapidly. Sales forecasting enables businesses to optimize inventory management, allocate resources efficiently, and develop strategic marketing plans that align with anticipated demand.

This report focuses on enhancing sales forecasting accuracy by leveraging data analytics and machine learning techniques. The study utilizes two datasets: a primary dataset containing detailed e-commerce transaction data sourced from Kaggle and a secondary dataset of macroeconomic indicators from the World Bank. The primary dataset provides insights into historical sales patterns, while the secondary dataset introduces external economic factors that can influence consumer behaviour, such as GDP growth, inflation rates, and unemployment rates.

By applying Linear Regression and Random Forest Regression models, the report aims to identify the most effective approach for predicting future sales. The analysis compares the performance of these models, evaluating their ability to capture complex relationships between sales data and economic indicators. The findings offer valuable insights into the strengths and limitations of each method, providing guidance on how businesses can integrate machine learning into their decision-making processes to improve forecasting accuracy.

Ultimately, this report underscores the importance of advanced analytics in empowering businesses to make informed, data-driven decisions that enhance operational efficiency and drive long-term success in the dynamic e-commerce landscape.