**Conclusion**:

The report encapsulates the comprehensive research undertaken to devise accurate prediction models for e-commerce purchase intentions. The project deployed multiple machine learning models, focusing primarily on the applicability of Naive Bayes, Logistic Regression, Decision Tree, Random Forest, K-Nearest Neighbours, and Support Vector Machine algorithms. The intent was to ascertain which models best predict whether a customer will finalize a purchase on an e-commerce platform based on their browsing session data.

Throughout special attention was given to handling the challenge posed by imbalanced datasets, which is a common issue in real-world data scenarios, particularly in e-commerce where purchase intentions are typically lower compared to browsing instances. Techniques like SMOTE (Synthetic Minority Over-sampling Technique) and Near-Miss algorithms were employed to balance the dataset, which significantly influenced the outcome of the predictions. The efficacy of these techniques was evident as they enhanced the predictive performance of the models, particularly for the Random Forest and Logistic Regression models, which yielded the most promising results.

It was observed that normalized and oversampled datasets yielded better results in terms of accuracy and other metrics like sensitivity and specificity. The Random Forest model stood out due to its robustness against overfitting and its ability to handle high-dimensional data effectively. Meanwhile, Logistic Regression provided a strong baseline with its capacity to output probabilistic scores, which are crucial for operationalizing the model outputs into actionable business strategies.

In conclusion, the study provides a clear roadmap for utilizing advanced machine learning techniques to improve the prediction of e-commerce purchase behaviours. It underscores the importance of sophisticated data handling and model selection strategies in building effective predictive models that cater to the dynamic needs of the e-commerce industry.