Title: Credit card fraud detection

1. Aim and Objectives:

The aim of this assignment is to implement an effective anomaly detection system for credit card transactions. The objectives include exploring and synthesizing relevant literature on anomaly detection techniques, conducting a thorough methodology for data preprocessing and model implementation, and critically evaluating the chosen approach. The goal is to achieve a high recall rate in detecting fraudulent transactions while maintaining model interpretability.

2. Literature Review:

The literature review delves into seminal works, academic papers, and articles related to anomaly detection in credit card transactions. Concepts such as feature selection, data imbalance, and various machine learning algorithms for fraud detection are explored. A synthesis of methodologies and findings from the literature provides a foundation for the chosen approach.

3. Methodology:

The methodology section elucidates the steps taken to address the assignment's problem. It covers data preprocessing techniques, including feature selection and handling class imbalance. The choice of the Logistic Regression algorithm, its implementation, and the use of SMOTE (Synthetic Minority Over-sampling Technique) for handling imbalanced data are detailed. Challenges encountered during implementation and their resolutions are discussed. Evaluation metrics such as precision, recall, and ROC curves are employed to assess the model's performance.

4. Conclusion:

The conclusion summarizes the key findings of the assignment, emphasizing the achieved recall rate and the significance of the implemented anomaly detection system. Limitations of the approach, including potential areas for improvement, are discussed. The assignment contributes to the understanding of fraud detection in credit card transactions and suggests avenues for future research.

This comprehensive report provides a detailed account of the assignment, from its aims and objectives to the methodology employed, ensuring a thorough understanding of the anomaly detection process in credit card transactions.

5. Referances:

Dal Pozzolo, A., Boracchi, G., Caelen, O., Alippi, C., & Bontempi, G. (2015). Credit card fraud detection: A realistic modeling and a novel learning strategy. \*IEEE Transactions on Neural Networks and Learning Systems, 29\*(8), 3784-3797.

Hodge, V. J., & Austin, J. (2004). A survey of outlier detection methodologies. \*Artificial Intelligence Review, 22\*(2), 85-126.