Problem Statement: Detecting Healthcare Fraud Using Anomaly Detection

By Abhisek Sarkar

General Introduction: Healthcare fraud poses a significant challenge for societies worldwide. Misuse of healthcare funding by materialistic practitioners or patients diverts resources that could otherwise be spent on essential medical services. With rising healthcare costs, detecting fraudulent activities becomes crucial3. In this context, we aim to develop an effective anomaly detection system to identify suspicious patterns in healthcare data.

Sub-Arguments:

- **Data Description and Features:** The dataset contains information about healthcare providers, services, and Medicare payments. Key features include National Provider Identifier (NPI), provider names, credentials, gender, location, HCPCS codes, and payment amounts.
- **Objective:** Our goal is to identify anomalous behavior related to healthcare services. Anomalies may include unusual billing patterns, unexpected service counts, or outliers in payment amounts.
- **Challenges:** Healthcare fraud can be subtle and adaptive, making it challenging to detect. Balancing sensitivity (detecting fraud) with specificity (avoiding false positives) is crucial.
- **Approach:** Explore unsupervised techniques (e.g., clustering, statistical methods) to find anomalies. Consider both provider-level and service-level anomalies.
- **Evaluation Metrics:** Precision, recall, F1-score, and area under the receiver operating characteristic curve (AUC-ROC) can assess model performance.
- **Impact:** Successful anomaly detection can lead to cost savings, improved patient care, and better resource allocation.

Summary: Detecting healthcare fraud using anomaly detection techniques is essential for maintaining the integrity of healthcare systems. By leveraging the detailed dataset, we aim to develop an effective model that can identify suspicious patterns and contribute to reducing fraudulent activities.