Abstract

In the era of digital transformation, stable internet connectivity has become crucial for public productivity. However, fluctuations in signal quality in service provider infrastructure such as Telkom often pose technical obstacles that are difficult to predict manually. This study aims to automate network quality classification to improve service monitoring efficiency.

This study applies the Decision Tree algorithm to analyse telecommunications infrastructure performance. The dataset used consists of 5,000 network performance data entries sourced from the Kaggle repository. The analysis process involves data preprocessing, data splitting, and classification modelling. The independent variables tested include download speed, ping latency, and packet loss, which are then classified into three target labels: Good, Fair, and Poor.

The model evaluation results showed impressive performance with an accuracy rate of 98%. Through feature importance analysis, this study found that download speed and ping latency were the most dominant predictors in determining signal quality compared to other variables. The resulting decision tree structure provided transparent rule-based visualisation, making it easier for the technical team to identify thresholds for service quality degradation in real time.

The machine learning approach with the Decision Tree algorithm proved to be very effective and reliable in mapping network conditions. These findings provide practical contributions for service providers in optimising infrastructure and making strategic decisions to improve customer satisfaction.

Keywords: Decision Tree, Signal Quality, Telkom, Network Accuracy, Machine Learning, Latency.