Abstract

There is a growing demand for mobile network data services which is driven by high number of smartphones and web content search as multimedia. Network operators have tried to provide enough capacity and meet the data speeds that the customer needs. This has led to introduction of new technology and expansion of the mobile networks making them complex to manage. Detecting anomalies that affect data throughput and investigating the root causes in mobile networks is challenging as mobile environments are increasingly complex, heterogeneous, and evolving.

There is need to automate network management activities to improve network management processes and prevent revenue loss. Self-Organizing network is a standard introduced by third Generation Partnership Program (3GPP) to automate network management. However, the standard is still not fully developed.

This project focused on implementing an anomaly detection and root cause analysis model that
helps in the process of data throughput optimization in Long-term evolution (LTE) networks. The model used Density Based Spatial Clustering of Applications with Noise (DBSCAN) for anomaly detection, K-Nearest Neighbour (KNN) for root cause analysis and real network performance data from a Kenyan operator.

Proposed anomaly detection model achieved a silhouette coefficient of 0.451 showing a good separation of existing clusters in the dataset and was able to detect anomalies with both positive and negative impact on data throughput. The root cause analysis model achieved an accuracy of 94.59% and was able to identify the root cause of detected anomalies that had a negative impact on data throughput.

References


Index Terms

Computer Science

Artificial Intelligence

Keywords

Density based spatial clustering of applications with noises (DBSCAN), K-Nearest neighbour (KNN), Long-term evolution (LTE), throughput