FINAL YEAR PROJECT REPORT

ANOMALY DETECTION IN CELLULAR NETWORKS USING MACHINE LEARNING

In fulfillment of the requirement
For degree of
BS (COMPUTER SCIENCES)

By

SYED TALAL HASSAN	51800 BSCS
MUHAMMAD MURTAZA KHAN	51831 BSCS
BILAL DOST MALIK	51812 BSCS

SUPERVISED

BY

SIR BILAL MUHAMMAD IQBAL

BAHRIA UNIVERSITY (KARACHI CAMPUS)

SPRING-2021

DECLARATION

We hereby declare that this project report is based on our original work except for citations and quotations which have been duly acknowledged. We also declare that it has not been previously and concurrently submitted for any other degree or award at Bahria University or other institutions.

Signature : _____

Name : SYED TALAL HASSAN

Reg No. : 51800

Signature : _____

Name : MUHAMMAD MURTAZA KHAN

Reg No. : 51831

Signature : _____

Name : BILAL DOST MALIK

Reg No. : 51812

Date : 17/06/2021

ACKNOWLEDGEMENTS

We would like to thank everyone who had contributed to the successful completion of this project. We would like to express my gratitude to my research supervisor, Sir Bilal Muhammad Iqbal for his/her invaluable advice, guidance and his/her enormous patience throughout the development of the research.

In addition, We would also like to express my gratitude to our loving parents and friends who had helped and given me encouragement.

ANOMALY DETECTION IN CELLULAR NETWORKS

ABSTRACT

The identification of "abnormal" events in datasets has long been a focus of machine learning research. Anomaly detection or outlier detection are terms used to describe this technique. Grubbs provided the most likely first definition in 1969. Outliers are observations that appear to diverge significantly from the rest of the sample. Although this criteria remains relevant today, the reason for spotting outliers has changed dramatically. Because pattern recognition algorithms were quite sensitive to outliers in the data back then, the major reason for the detection was to eliminate the outliers from the training data thereafter. Data cleaning is another name for this operation. The interest in anomaly detection has waned significantly with the emergence of more robust classifiers. However, in the year 2000, academics began to become increasingly interested in the anomalies themselves, as they are frequently linked to certain noteworthy occurrences or questionable data sets. Anomaly detection methods are currently employed in a wide range of applications and are frequently utilised to supplement classic rule-based detection systems.

Traditionally, the design of a cellular network has focused on energy and resource optimization to ensure that the network operates smoothly even during peak hours. This means, however, that radio resources are frequently overprovisioned in cells. In order to react to changing user demands in the most effective way possible in terms of energy savings and frequency resource use, next-generation cellular networks require dynamic management and configuration. Machine Learning approaches are now being studied in mobile networks to assist with resource management. In this scenario, you will look at how machine learning can be used to detect abnormal network usage patterns that might lead to a change in the base station's setup.

TABLE OF CONTENTS