DYNAMIC DISCOVERY AND RECOMMENDATION OF CELLULAR NETWORK SERVICE QUALITY

Purvi M N[1], Pradeep P [1], Pradeep Kumar H S[2]

[1]Dept. of ISE, The National Institute of Engineering, Mysuru,
[2]Asst. Professor, Dept. of ISE, The National Institute of Engineering, Mysuru

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Abstract - *The aim of this paper is to develop an application that will help the users to have hassle-free communication via mobile phones by improving the quality of the network service in case of poor connection in certain areas. When people have to communicate through phones, they often face network drop issues. This may lead to frustration in the users while having any important conversation or even in case of emergency. The users have to complain against such issues to the respective network operator. It may take more time to get these issues resolved. In emergency situations, it is very difficult for users even to complain about the problems faced by them because of network drop or poor quality of networking service.*

This can be ensured by a system by developing an application by incorporating machine learning technology for the mobile users to have smooth conversation over phone. Initially a data set is framed by grouping the users area wise in a city. When any user face poor network issue/ if there is any network drop, a pop up is displayed on the user's mobile screen where the user can rate the quality of the network by selecting stars. Based on this rating, a graph like structure is displayed on the dashboard for effective visualization

Key Words: **Network service quality, Recommendation System, Dynamic service discover Framework, Mobile service quality, Machine learning.**

1. INTRODUCTION

Mobile technology is the technology used for cellular communication. Mobile code division multiple access (CDMA) technology has evolved rapidly over the past few years. Since the start of this millennium, a standard mobile device has gone from being no more than a simple two-way pager to being a mobile phone, GPS navigation device, an embedded web browser and instant messaging client, and a hand-held game console. Many experts argue that the future of computer technology rests in mobile computing with wireless networking. Mobile computing by way of tablet computers are becoming more popular. The most popular tablet at the moment is the iPad, by Apple.Over the past few decades, Machine Learning (ML) has evolved from the endeavour of few computer enthusiasts exploiting the possibility of computers learning to play games, and a part of Mathematics (Statistics) that seldom considered computational approaches, to an independent research discipline that has not only provided the necessary base for statistical-computational principles of learning procedures, but also has developed various algorithms that are regularly used for text interpretation, pattern recognition, and a many other commercial purposes and has led to a separate research interest in data mining to identify hidden regularities or irregularities in social data that growing by second.

In the current world lots of electronic data is generated in each and every field. These data contains useful information to predict the future. Due to the huge in size, the manual predicting gives a complex task to humans. To overcome this problem, train the machine to predict the future by itself with the help of training and test datasets. To train the machine, various kinds of machine learning algorithms and tools are available. Few machine learning algorithms and techniques are used in many applications and domains.

1.1 DATA COLLECTION

The data-set provided is related to telecom which has the ratings provided by the caller.The data-set also captures the position of the caller (latitude and longitude), time of call and duration of call. For data privacy purposes not all data provided in the data-set are actual some data are randomly generated.

2. INSIGHTS FROM ANALYSIS

This report represents our analysis for the given data-set.It is in our opinion that based on the data provided, there is no significant difference between the ratings given a reference position(lat and long) and radius distance from the reference position. This in turn means no meaningful conclusions can be drawn on the network strength.

A Google map widget is also included as part of this report giving flexibility for the user to choose his/her own reference point and radius distance. Probably used with real time data might give pretty good insights on the network strength.

Another insight we wanted to derive from the data was to see high correlation of rating with network strength. However for the same exact location we find a wide discrepancy in the ratings. This might be because of randomly generated ratings in the data-set.

2.1 DATA ANALYSIS

Following shows necessary imports for data analysis

• importing pandas for data manipulation

• import seaborn and plotly for data visualization and Google maps widget

• import plotly go for displaying location in world map

• import haversine for distance measure

• Next we need to import the collected data-set

2.2 GOOGLEMAP WIDGET

 A Google map widget is provided which takes a reference point as latitude and longitude and distance(in kilometers) below figure shows the Google map with the respective ratings for given latitude ,longitude and distance when cursor is moved on those points.

Fig -1: Display of rating via Google-map widget

Bar chart to count total number of particular ratings between a range of (0-5) as shown below. In python Bar chart can be implemented using Matplotlib**.**
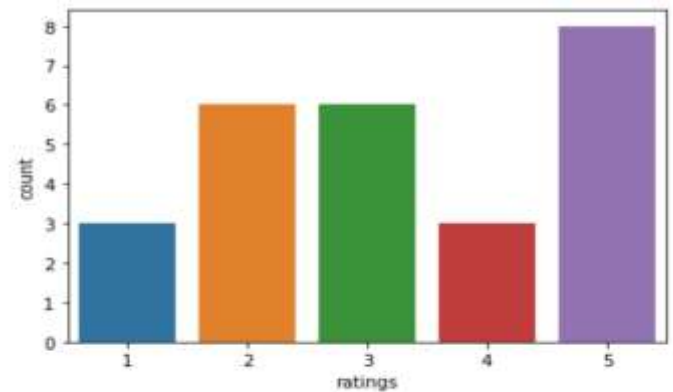

Chart -1: Distribution of ratings

We can also plot the call positions on the world map and this can be done using python.

And for this particular python library can be used (i.e, GeoPandas) below figure shows it.

Fig -2: Location of call origination in world-map

3. ANDROID

Information related machine learning related to network analysis is mentioned above and apart from machine learning android technology is used to develop an android application which is an important aspect of this analysis. Information related particular user need to be captured for network analysis is as follows and they are mentioned below:

1. Location of user needs to be captured.
2. Need to know the number of the individual who has initiated the call along with name of the network provided.
3. Need to know the number of the individual who received the call.
4. Duration of the call needs to be captured.
5. Finally need to capture the rating for particular call and rating ranges between(0-5).

All above information needs to be collected explicitly from the user and it can be done using a function called "CheckPermission".

And user should enable permissions like internet, location, phone state, call logs etc..

3.1 BROADCAST RECIEVER IN ANDROID

Application need to know the current status of the mobile it may include following possibilities they are:

1. Incoming call
2. Outgoing call
3. Ideal call

The API called BroadcastRecevier helps to know the current status of the mobile. And it also can be used to know the status of SMS, battery status of the mobile and boot status of the mobile.

3.2 ALERT ACTIVITY IN ANDROID

In case of network analysis main aspect is collect the number of the individuals who are in communication with each other. Along with number it is equally important to collect the latitude and longitude of the location and radius which represents how far an individual is from the particular tower where call has been established. And it is equally important to collect the ratings for the particular call and it can be done by writing code using Alert Activity function.

3.3 USE OF GOOGLE API CLIENT

Alert Activity implements Google API Client which helps in capturing information of call and information of location.

In case of Google API Client there are two types of Listener they are:

1. OnConnectionFailed Listener: This function is triggered when call has been disconnected due to poor network connection.
2. ConnectionCallbacks: This function is used to call back the disconnected call which was disconnected due to poor connection.

Google API Client also responsible to capture location information using function called Location Listener

4. CONCLUSION

The proposed system developed is an android based mobile application that will help the users to have hassle-free communication via mobile phones by improving the quality of the network service in case of poor connection in certain areas. This application provides rating option for the users of the concerned mobile network to enhance the quality service by the network service providers by displaying the results through dashboard.

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