Project Description:

Predicting mobile network coverage is a key challenge in the communications industry. Accurate predictions can help network operators optimize equipment deployment, reduce costs, and improve user experience. This project aims to develop a machine learning model that forecasts mobile network signal coverage in specific areas using factors such as geographic features, data transfer speeds, and network infrastructure.

By integrating data from multiple sources, we will build a comprehensive dataset to train models like gradient boosting, decision trees, random forests, regression, K-Nearest Neighbors (KNN), and deep learning approaches. These models will learn complex relationships among variables to predict network coverage accurately. Evaluation metrics such as Mean Squared Error (MSE) will be used to assess performance.

The outcome will assist network operators in identifying underserved regions, addressing coverage gaps, and making informed decisions on infrastructure development, ultimately enhancing mobile network performance and user satisfaction.

Objectives

The main objective is as follows:

- Accurate Coverage Estimation: The main goal is to create a model that accurately forecasts the mobile network coverage in various locations. Identifying regions with strong signal strength and those with weak or no signal is a slice of this process.
- Planning and optimization of the network: Machine learning can assist in determining where network coverage wants to be enhanced or improved. Network administrators can better deploy network resources, place base stations in the best locations, and optimize antenna designs by forecasting coverage.
- Subscriber Experience Improvement: The subscriber experience is directly impacted by mobile network coverage. By accurately forecasting coverage, we can proactively fix network faults by identifying regions where subscribers may experience problems such as dropped calls, sluggish data speeds, or poor speech quality.
- Cost Reduction: Predicting mobile network coverage can also assist network operators in cutting expenses. Operators can avoid wasting money on infrastructure upgrades in places where the coverage is already adequate by appropriately predicting coverage. This results in cost reductions and optimal resource utilization.
- QoS Monitoring: The service quality of the network can be continuously monitored using machine learning algorithms. Operators can evaluate the quality in various

locations, identify anomalies or regions with poor performance, and take preventative action to uphold or enhance the service quality by predicting coverage.

● Network Expansion and Rollout Planning: Accurate coverage prediction becomes essential whenever a mobile network is being expanded or while preparing for network rollouts in new locations. To be able to predict coverage gaps, locate highdemand locations, and plan the network development strategy appropriately, machine learning algorithms can help.

Problem Statement

In command to maximize their network investment and cut down on unnecessary costs, operators can make accurate coverage projections. Operators can more effectively manage resources, lowering operational costs, by focusing on locations with the greatest opportunity for revenue production or places with subpar coverage.

Existing System

Existing studies use machine learning techniques like Support Vector Machines, Random Forests, and k-Nearest Neighbors to predict mobile network coverage. These models incorporate geographic features, signal strength, building density, terrain, and land cover data. However, they face limitations in **scalability, computational efficiency**, and **integration of diverse data sources**.

Proposed System

The proposed system enhances prediction accuracy using **ensemble learning techniques** such as Gradient Boosting, Random Forests, and ANN. It integrates a broader range of data including topography, building heights, and vegetation density. The system leverages **modern architectures** like cloud computing and microservices for better **scalability, flexibility**, and **performance**.

Tools and Technologies Used

1. Streamlit

2. Folium:

3. Geopy:

Hardware and Software Requirements

● Operating System: Windows OS 7 and above

● Programming Language: Python

●Frontend Technology: html, css, Javascript

●Database: SQLite

●Framework:Flask

●Machine Learning:scikit-learn

● IDE: VS Code 2.4.2 Hardware Requirements

● CPU: i3 processor, 1.2 GHz ● RAM: 4 GB ● Storage: 10 GB

Conclusion

Method for predicting network coverage using a variety of parts and libraries, including Streamlit, Pandas, Folium, and scikit-learn. Users can choose circles, forecast network coverage, and view the outcomes on an interactive map using the technology. You took into account crucial elements including data loading, clustering with the Kmeans method, data filtering, and visualization while creating your code. Additionally, the system includes geolocation capabilities for getting latitude and longitude coordinates, figuring out distances, and creating URLs for directions