Boston University
Electrical & Computer Engineering
EC463 Capstone Senior Design Project

First Prototype Testing Plan

5G Network Performance Testing - Sky Seer

Team #16
5G Drone Team Red

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Overview and Setup

This overall system for the project has a hardware and software component. We do not yet have the drone, so the hardware component will just be the cellphone conducting the actual data collection. Additionally, we do not yet have a 5G SIM card, so for this prototype test, the phone will only be collecting 4G network speed data. Furthermore, because the test will also be conducted in the lab, only ground network speed data will be collected. Another important point to mention is that the prototype test will use a lot less data points than the actual project since the test is being demonstrated real time. A larger training dataset will need to be developed over time for the final product.

The main setup is to ensure the phone is connected to the desired network. The actual project will use a 5G network, but as mentioned, a 4G network will be used for now. The database can be viewed and the machine learning algorithm can be run on a laptop.

Testing Materials

Hardware:

- Phone (will have 4G connectivity instead of 5G for prototype test)
- Laptop
- Sim Card

Software:

- Data collection script
- Machine learning model code
- MySQL Database

Testing Procedure

1. Run the data collection script on the phone to collect network speed data (upload and download speed on OOKLA) and collect location data (longitude, latitude, and altitude)
2. The collected data is pushed into the database
3. The machine learning algorithm is run to produce predictions from the collected data
    a. Read data from the database
    b. Data pre-processing for training
    c. Calculate predictions (MultiOutput Regression)
    d. Plot for visualization

Measureable Testing Criteria

- ☐ Network speed tests can be performed by the phone
    - ☐ Compare network performance data with OOKLA speed test app and see if there are any correlations
- ☐ Data collected by the phone can be pushed to the database
    - ☐ Use digital data such as images, dataset, etc
- ☐ Data can be accessed from database for use in the machine learning algorithm
    - ☐ Download sample data
- ☐ Machine learning algorithm can calculate predictions from gathered data
    - ☐ Run sample data
    - ☐ Use the sample data to make predictions
    - ☐ Make note of the predictions that the ML model made
- ☐ Location data
    - ☐ Record *longitude, latitude, and altitude*
    - ☐ Compare with MATLAB mobile application location sensor
    - ☐ Take 3 different data from the top floor of different BU buildings.

Network Speed Test

Time stamp	OOKLA Upload	OOKLA Download	Upload	Download

GPS Speed Test

Location	gps.py	Matlab	Other location tracking methods
Building: Floor:	Longitude: Latitude: Altitude:	Longitude: Latitude: Altitude:	Longitude: Latitude: Altitude:
Building: Floor:	Longitude: Latitude: Altitude:	Longitude: Latitude: Altitude:	Longitude: Latitude: Altitude:
Building: Floor:	Longitude: Latitude: Altitude:	Longitude: Latitude: Altitude:	Longitude: Latitude: Altitude:

Sample Data(Cloud database)

Sample Data 1:	Note:
Sample Data 1:	Note:
Sample Data 1:	Note:

Sample Data (ML model)

Training Data:	Prediction:	Note:
Training Data:	Prediction:	Note:
Training Data:	Prediction:	Note: