

Proposal:

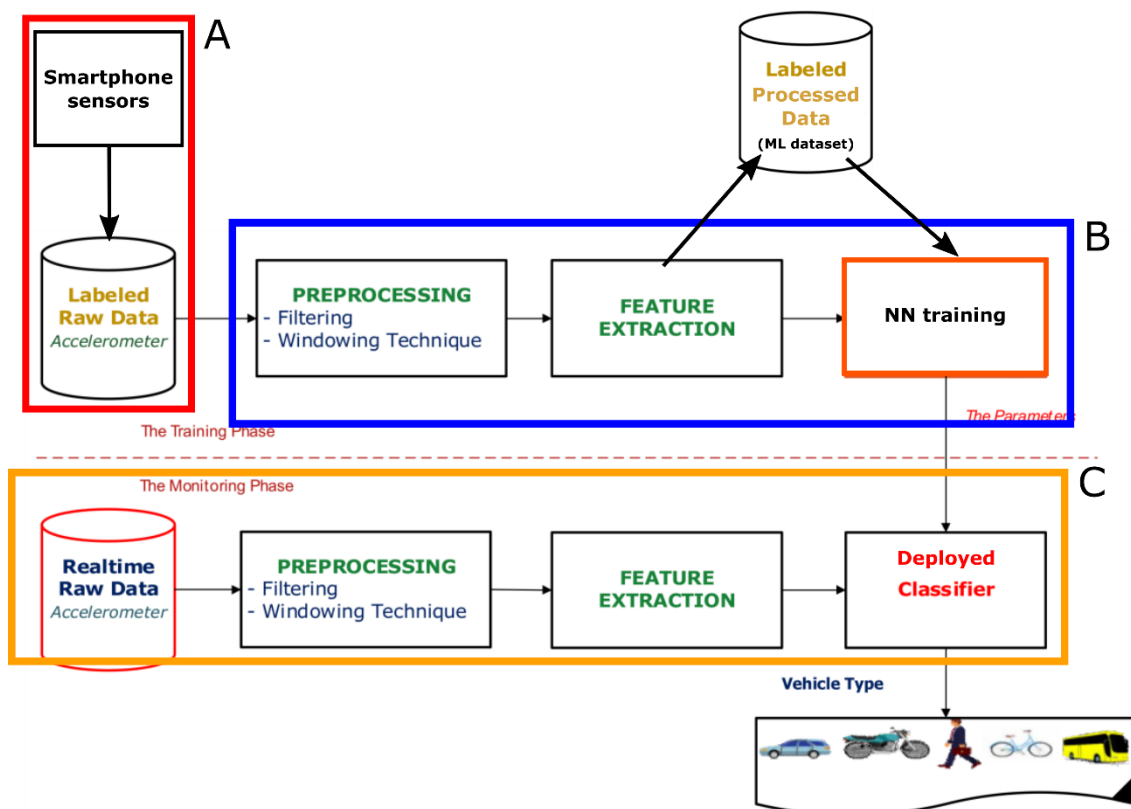
Vehicle Identification App: Android based application that detects the type of vehicle (bike, car, walking) the device is in.

Description:

The application will have 3 modes of operation:

- 1) Data Collection mode: allows user to record data from the sensors (accelerometer, magnetometer, gyroscope) in the smartphone and add the labels.
- 2) Processing mode: preprocess the raw data acquired from the previous mode. Train and deploy the vehicle type classifier.
- 3) Monitoring mode: the application will read the smartphone sensor data and execute the classifier with the collected samples, returning to the user the predicted vehicle type in real-time.

System Overview



A. Collect Data

- a. Read the data from the smartphone sensors, and associate labels to the reading intervals. Provide an interface for it.
- b. Store the sensor data and labels in a local database (Raw Data).

B. Preprocessing

- a. Filter accelerometer data (LPF to remove noise).
- b. Rotation matrix correction.
- c. Azimuth, Pitch and Roll parameter calculation.
- d. Feature Selection (gyroscope and magnetometer data as well as Azimuth change may be added to test the NN training with different features).
- e. Use different data collection window size (time interval) and overlapping ratio (percentage) to compare the deployed classifier performance.
- f. Store the preprocessed data in a local database (Machine Learning dataset).
- g. Use Android Neural Networks API to create and train a MLP classifier.
- h. Deploy the classifier.

C. Monitoring

- a. Collect data in real-time from the sensors. Execute the Preprocessing functions in the collected sample.
- b. Execute the deployed classifier with the preprocessed data from the sample.
- c. Show in the interface the result of the classifier (Identified vehicle).