Real-world Demo of ML-based Gesture Recognition

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- Why? Existing ML models, especially Deep Learning models, are too computationally expensive for predictions on the edge, or in real-time. Transmitting all the data to the cloud results in a) round trip latency cost b) battery drain for the communication power and c) compromises privacy.

- For Whom? Healthcare and IoT, Wearable Electronics, Low Latency Predictions in browsers and mobiles, low-cost prediction in cloud.

- What: We have designed a ML based gesture recognition system that can detect complicated gestures accurately.

- Model Size: This has been made possible due to a) our handcrafted features b) ProtoNN multiclass classifier [part of EdgeML suite] and c) integer optimized implementation. Our model generated is ~6kB.

GesturePod

Plug-and-play pod

ProtoNN & Bonsai

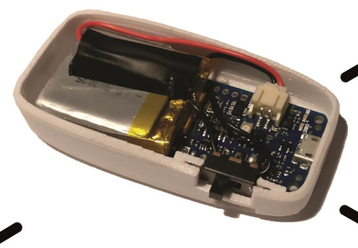
Machine learning models for edge devices that run on less than 2kB RAM.

Smartphone Experience

Rich UI experience using natural gestures.

Plug and Play Design

Lightweight and flexible design which is adaptable to any cane.



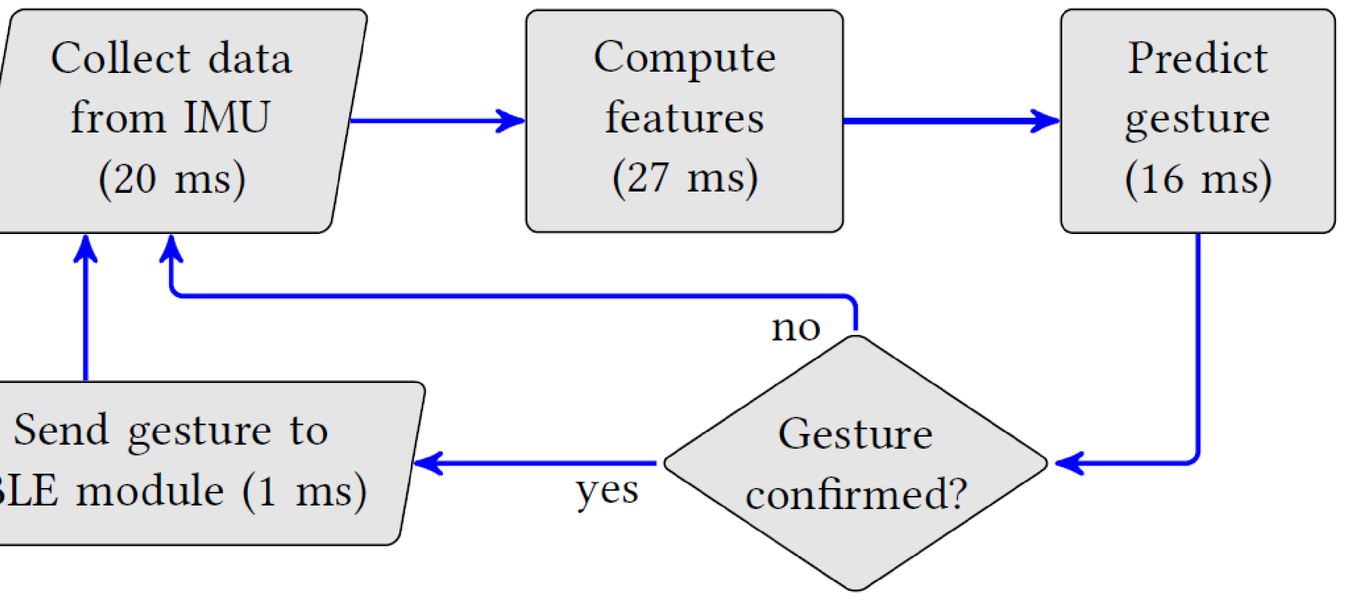
Internals of the prototype

Performance

Low Latency : ~50 milli seconds to recognize gesture.

Electronics and Components

ARM M0+ class microcontroller.
Accelerometer and gyroscope.



Prediction pipeline loop that runs on the singlethreaded microcontroller (must finish in 100 ms).

Workflow for generating a tiny model

Scan me to learn more

← github.com/Microsoft/EdgeML

Data Collection

Collect and label acceleration and Gyro time series for gestures from many users.

Feature Engineering

Extract the right set of features for the data collected.

Model Training

Train ProtoNN model on TLC with size constraints.

Deploy on pod

Engineer a pipeline that gathers data, computes features and predicts in real-time