Gesture Prediction using Sensors

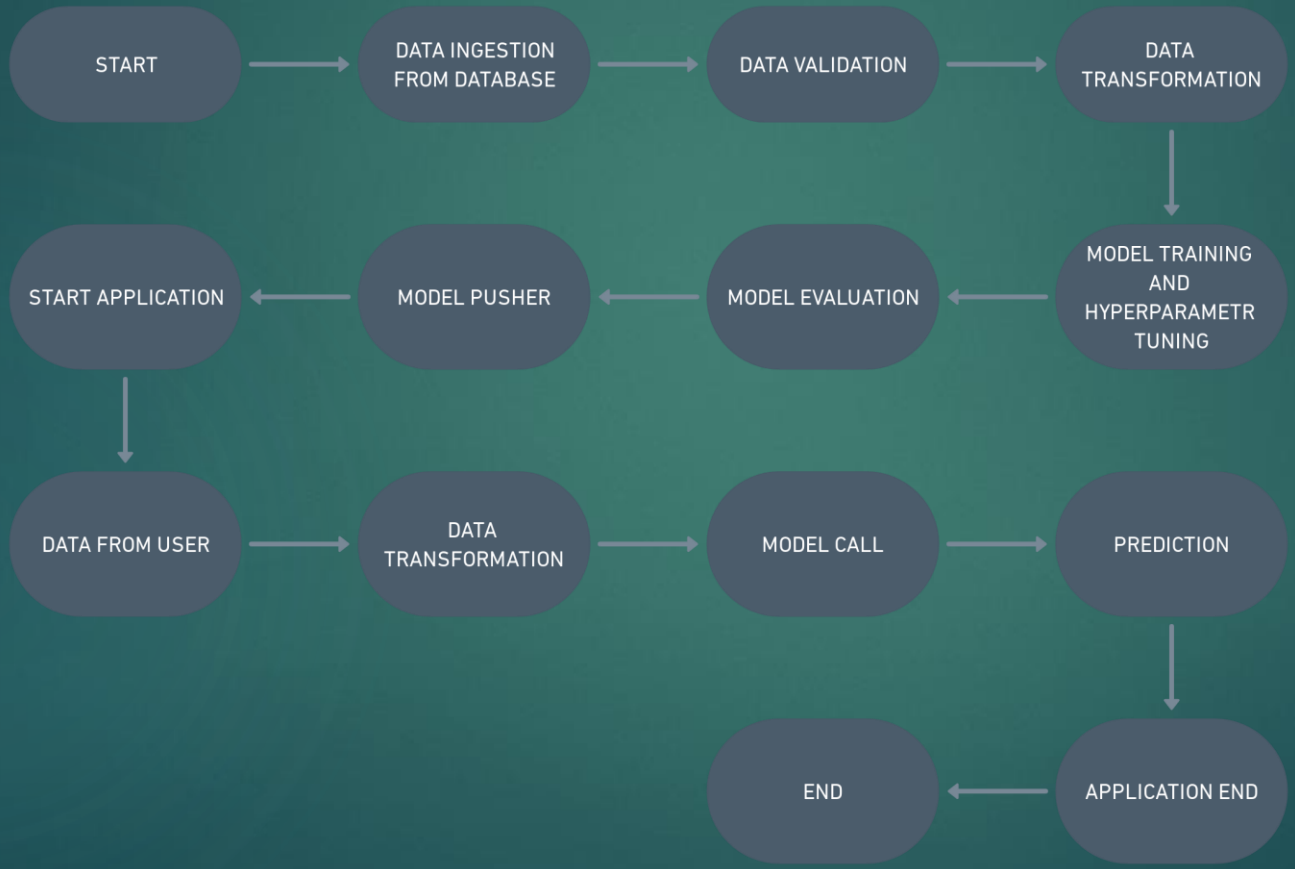
Objective

- The goal of project is to predict the gesture of user by using sensor outputs from a wearable device. This can be further used for prosthetics or to control gadgets.
- Benefits:
  - Can be used to control gadgets by using gestures
  - Can be used to aid prosthetics

Data Sharing Agreement

- Column names
- Column data type
- Numerical Columns names
- Categorical Columns name
- Target columns name
- Domain Values of categorical columns

Architecture



Data Ingestion and Validation

- For recording patterns, we used a MYO Thalmic bracelet worn on a user's forearm, and a PC with a Bluetooth receiver. The bracelet is equipped with eight sensors equally spaced around the forearm that simultaneously acquire myographic signals. The signals are sent through a Bluetooth interface to a PC. The signals are processed using machine learning techniques to predict the gesture.
- This data is stored in Cassandra Data base
- Data is ingested and stored in feature store in host GCP VM
- Data is validated for required number of columns and their data types
- Un necessary columns are dropped
- Missing value imputation is done

Data Transformation

- Target Encoding is done as it's a classification problem
- Normalization of Data is done
- Simple imputation is done
- All the pre-processing steps were kept in the pipeline and saved as an object file.

Model Training ,Evaluation and Selection

- During EDA different models were tested and tuned for best hyper parameters using a sample of data
- The best chosen algorithm is used for training in production.
- The final model is trained on entire data set and kept in production for prediction
- On getting new data for training the new model and best model are compared and only if new model is performing better than the previous one it is moved to production by comparing the f1 score metric

Prediction

- The user inputs the required details over the API and submits them.
- At the backend the combined saved object file is called which does the required transformation as well as the prediction using the input data.
- The outcome of the prediction along with the user inputs is displayed over the API for the user.