**Lab 5 – Machine Learning as a Service**

Members: Jeevan Rai, Arman Kamal, Clifton Wallace

Overview:

Our app utilizes machine learning to train models and predict hand gestures, identifying whether the user is making a "rock," "paper," or "scissors" gesture. The app is structured around four controllers:

1. **Settings**:
   * Allows users to configure the IP address of the FastAPI server.
   * Enables users to set the DSID (Dataset Identifier) number.
2. **Training**:
   * Facilitates the training of models by capturing images of hands and labeling them as "rock," "paper," or "scissors."
   * Sends this data to the FastAPI server, where it is stored in a MongoDB database.
   * Once sufficient data is collected, users can train one or all of the three available models:
     + Turi: Uses the Turi Create API to select the best model and return the training accuracy.
     + Boosted Tree: Explicitly trains using the Boosted Tree algorithm and returns the accuracy.
     + Random Forest: Explicitly trains using the Random Forest algorithm and returns the accuracy.
   * Each model is saved on the server for future predictions. Additionally, each model is converted to an MLCore format and stored for embedded application use.
3. **Prediction**:
   * Allows users to select a trained model to predict the user's hand gesture in real-time.
4. **MLCore**:
   * Enables the use of converted Boosted Tree or Random Forest models in the app for gesture prediction without relying on the server.

NOTE: Boosted Tree and XGBoost are not the same thing. There are references in the code to XGBoost (labels, variable, etc.) that are incorrect and should be Boosted Tree. However, this was caught late and we could not change the code. The code works and is using Boosted Tree – it just maybe confusing as methods, variables, etc. indicate XGBoost.