Earthquake Hazard Evaluation & Visualization

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ABSTRACT

The scope of this project is to build a model that would predict the seismic damage level of a certain building.

PROBLEM DESCRIPTION

The disaster caused by earthquake has left unforgettable memories to us. Recent breakthrough in machine learning algorithms and earthquake prediction models allow us to locate it and predict damage level of it.

MODEL SELECTION & EVALUATION

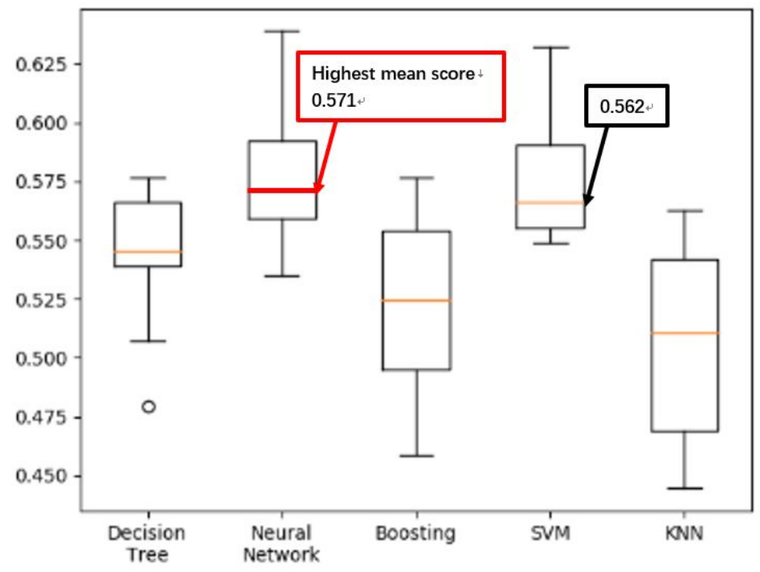


Figure 2. k-folds cross validation comparison with k = 10

Model Input & Data Preprocess

Decision Tree
Neural Network
Ada-Boosting
Support Vector Machine (SVM)
K Nearest Neighbors (KNNs)
PC Regression & Partial Least Square

METHOD and IDEAS

Five steps we took:

- **Database construction**

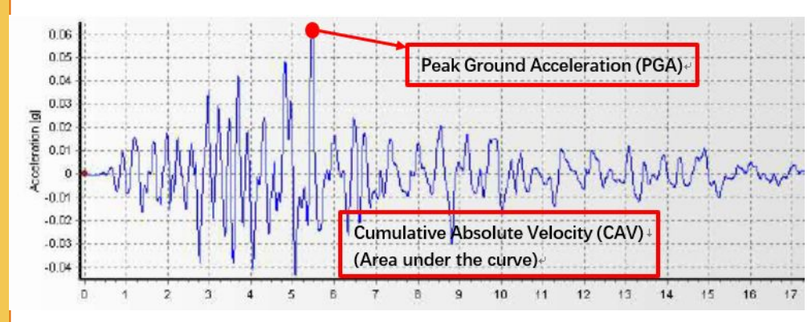
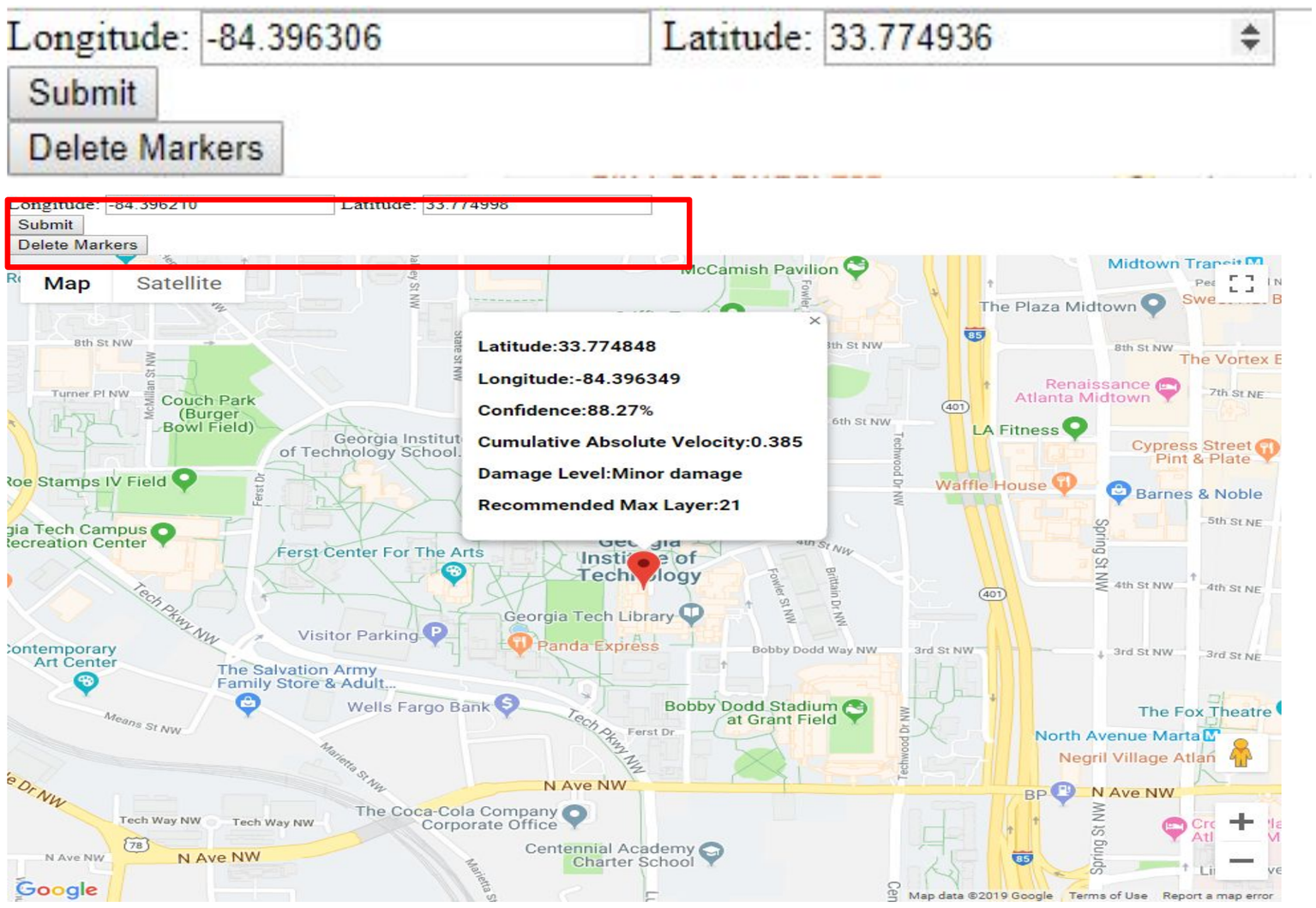


Figure 1. A typical ground motion plot

- **Model Features Selection**
  Determining period using Lasso
- **Prediction Model Construction**
  Machine learning Regression Algorithms
- **Prediction Model Evaluation**
  K-fold cross-validation
- **Damage Level Prediction**
  Relate the predicted CAV value to the damage of a building
- **Data visualization**
  Output longitude, latitude, predicted earthquake intensity, confidence, recommended maximum layer of building

DATA VISUALIZATION

Input Geographical Location Information or **Click** on Map



Output : Longitude, Latitude, Predicted Earthquake Intensity, Confidence, Recommend Maximum Layer of Building

FUTURE USAGE

Our project can be used by earthquake associations as the reference of revising seismic design code in order to ensure the earthquake resistant behavior of newly constructed buildings in a more economical way.

Moreover, the program can predict the damage of current buildings to make the disaster rescue scheme wisely.