Ubiquitous and Mobile Computing
CS 528: Mobile machine/deep learning support in MATLAB,
SMS and Telephony

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Background

Neural Network
- 2006

SVM
- 2013

CNN
- 2016

LSTM
- 2017
Algorithms in Various Versions

- Logistic regression (Statistics and machine learning toolbox) R2006
- neural network (deplearning) before 2006
- SVM (Statistics and machine learning toolbox) R2013
- CNN (Computer Vision Toolbox) - R2016
- LSTM (Deep Learning Toolbox) - in R2017
Problems – Image Classification


https://www.homedit.com/decorate-with-tall-indoor-plants/
Problems – Object Detection

- Clutter score
- Traffic score

https://towardsdatascience.com/is-google-tensorflow-object-detection-api-the-easiest-way-to-implement-image-recognition-a8bd1f500ea0
https://www.transportation.gov/tsi/highway-traffic-safety
Problems – Speech to Text

Problems - Translation
https://medium.com/salesforce-developers/continuous-integration-for-salesforce-lightning-development-a59adf1a21be
Real world examples

- Library for CNNs
- Oxford Visual Geometry Group
Human Activity Recognition Simulink Model for Smartphone Deployment
Load Sample Data Set

- load humanactivity
- 24,075 observations of five activities
- Sitting, Standing, Walking, Running, and Dancing
Prepare Data

- \( \text{XTrain} = \text{feat(} \text{trainingInds, :)} \);
- \( \text{YTrain} = \text{actid(} \text{trainingInds)} \);

- \( \text{XTest} = \text{feat(} \text{testInds, :)} \);
- \( \text{YTest} = \text{actid(} \text{testInds)} \);

- \( \text{tTrain} = \text{array2table(}[\text{XTrain} \; \text{YTrain}]) \);
Load data in Classification Learner
Train Model
Deploy to Hardware
Simulink Support for Android

Simulink Support Package for Android Devices/Sensors

- Robust Control Toolbox
- Simscape
- Simulink 3D Animation
- Simulink Coder
- Simulink Control Design
- Simulink Design Optimization
- Simulink Desktop Real-Time
- Simulink Extras
- Simulink Requirements
- Simulink Support Package for Android Devices
  - Advanced
  - Audio & Video
  - Communication
  - Sensors
- User Interface
- Stateflow
- System Identification Toolbox
- Recently Used

- Accelerometer
- Ambient Temperature Sensor
- Gyroscope
- Humidity Sensor
- Light Sensor
- Location Sensor
- Magnetometer
- Orientation
- Pressure Sensor