Computer Science MQP Interests 2017-2018

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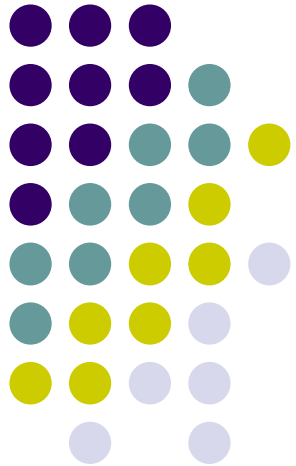
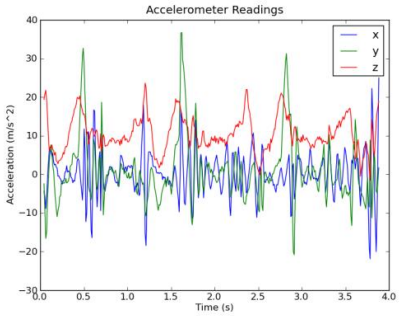


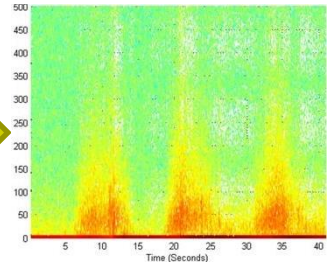
General Areas of Interest

- Intelligent mobile apps, detect user behavior
  - Phone sensor data + Machine learning
  - Application areas:
    - Health, wellness (eating, drinking, smoking)
    - Security

MQP Idea 1: Using Deep Learning to Infer Intoxication levels from Gait (Smartphone + Smartwatch)



Raw accelerometer readings



Deep learning

BAC/How much alcohol consumed?

- **MQP idea: Detect alcohol consumption using (smartphone + smartwatch)**
  - **Prior work:** supervised learning to detect intoxication (smartphone + smartwatch)
  - **This MQP:** Use deep learning/Neural Networks on accelerometer, gyroscope data

MQP 2: Drunk Selfie App

- App to detect how drunk a person is from their selfie?
- **Facial analysis:** can we make reliable inference using machine learning?

- Dataset?
  - Brazilian photographer took pictures of people after 0, 1, 2, … glasses of wine
  - Machine/deep learning on these pictures
  - **Stretch goal:** Build actual drunk selfie Android app

MQP 3: Detect Exergame Enjoyment

Co-advised with Prof Mark Claypool

- **Geocaching:** treasure hunt game
- Users love geocaching but suddenly quit without warning.
- **MQP idea:** Detect if **geocaching** user enjoying game or getting bored
- Machine learning classifiers, automatically detect user enjoyment
  - Game session statistics (duration, replay frequency, play times, etc)
  - Step count totals, walking patterns, distance from home

MQP 4: Smartphone Depression Detector

co-advised with Prof Elke Rundensteiner

- App to detect depression from voice, walking patterns, text patterns, smartphone soft sensors (call, SMS patterns, etc)
- Subjects, fill out PHQ-9 (Depression questionnaire)
- **Mobile sensing:** Retrieve Google Fit records (step count, locations visited, texts)
- Analysis: what activity, sleep, converstation level = high depression

Labels (for classifier)

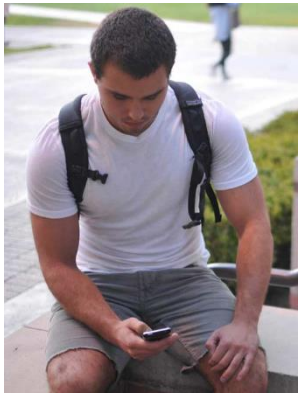
Voice sample

Depression Questionnaires (PHQ-9)

Retrieved from Subject's phone

SMS/Twitter
- Messages

Google Fit record
- Sleep
- Step count
- Movement
- Places/locations visited
- Activity Level, etc



MQP 5: Mobile Behavior based Authentication

- Passwords are annoying to remember

- **MQP idea 5:** Authenticate users based on unique real-world behaviors (behavior signature), no need for entering passwords
  - Locations-time visited
  - Activity-time patterns
  - Apps used
  - Walking patterns
  - Phone tilt habits

  - Deep learning to discover unique signature, authenticate
  - Extend prior MQP

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