Research Plan

# HCII REU Summer 2018

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**Major Contributions to field:**

1. Total body analysis using Kinect for task sequencing
   1. Determining the optimal sensitivity for total body analysis
2. Multi-frame analysis for task recognition
   1. Vs running computer vision on a single frame among video files

**Hypothesis:**

An unrefined video analysis will have a higher MEC than an unrefined frame analysis

A refined video analysis will have a higher MEC than an unrefined video analysis

**Variables:**

* Refinement
  + 0,25,50,75
    - Uniform
    - Tailored
* Input Data
  + Video
  + Frame
* Transformed Features
  + All possible combinations (x7)

**Constants:**

* Neural Network and its Hyperparameters
* Down sample by half
* Use of Kinect to collect Data
* Orientation
  + Chest facing Kinect Camera
* Chest standardization for coordinates
* Distance to Kinect (Yellow Line)

**Assumptions:**

* Data from the current demographic (Age 18-22) will generalize into the general population
* The change in Refinement, Input Data, and Transformed Features will not impact the optimal training settings (Hyperparameters)

**Questions to answer (in order of precedence):**

1. What are the best Hyperparameters
   1. Nail down: Architecture, Regularization, Activation, learning rate, batch size, and epochs
2. What type of transformed features are best?
   1. i.e. Position, Velocity, Task Detection, or a combination of the three
3. Which level of total body analysis works best?
   1. 0% Refinement (All joints) 🡪 25% Refinement 🡪50% Refinement 🡪 75% Refinement (only “valuable” joints)
4. Does a video analysis perform better than a frame analysis in mirrored situations?
   1. i.e. Same number of test cases, same raw data, etc.

**Future Work:**

1. Do the same rules for 1,2,3,4 apply to error checking?
   1. If we have time…

**Notes:**

* Emerge from each step with a concrete decision to move forward with an outcome
* When tweaking the hyperparameters, have AT MOST 3 options, preferably 2

**Things to do for poster:**

1. How do we present our data to prove our conclusions