CS 3600 Extra Credit – Aware Home Study

The primary goal of Dr. Kunda’s research study in the Aware Home is to develop computational methods for understanding human behavior with a wearable, first-person video perspective of the world. In order to do this, the research team is trying to develop computer vision algorithms to start breaking apart those videos into meaningful data that computers can interpret. For example, they want to get computers to start recognizing people’s hands, the position their hands are in, how those people are coordinating their motor actions with their visual gaze, and so on. As a result, one of the main motivators for this study is human health. In health research, there are a lot of interesting aspects of human behavior that researchers are struggling to understand. Among other topics, this includes understanding how social interactions work, understanding hand-eye coordination, understanding how people direct their gaze around an environment, and determining whether something can be told about someone’s memory or stress levels by the way he or she is looking around. Historically, researchers have had to bring test subjects into a lab, such as the Aware Home, in order to study these topics. Eventually, it would be ideal to have the ability to do these studies inside people’s homes, so it would be a more realistic environment.

The purpose of this research study, however, is simply to gather data of human behavior. In this case, the data is first-person videos of test subjects doing everyday tasks, collected with the use of special eye-tracking glasses. Ultimately, this dataset will be published for public use so other researchers can use it to develop algorithms similar to the ones Dr. Kunda’s team are studying or even use it for something completely different.

While this particular research study’s only purpose is to collect data, it has many potential uses. One example from Dr. Kunda’s lab is the studying of action recognition where researchers tried to develop algorithms to recognize what someone is doing with his or her hand. It is easy for humans to recognize actions and gestures, such as picking up a cup, but it is extremely difficult for a computer to do the same thing. With the help of the data obtained through the Aware Home study, they will be able to develop new algorithms for action recognition. A typical approach to these kinds of problems relies heavily on machine learning. Their algorithms use a very standard machine learning pipeline where they extract specific low-level features from the data to observe things like shapes of objects, hand poses, and hand movements through space. Then, a variety of other algorithms, such as support vector machines and neural networks, are used to learn to classify inputs into different categories. This is done by feeding the algorithms existing data that has already been manually labeled and classified, so the algorithms can be trained and tested on new data for refinement.