Solution

For heel Strike:

This would be a brief introduction of what I do and some methods of what I thought about the further steps about how to recognize all the actions other than “heel strike”.

I am using SVM algorithms for recognizing the heel strike. Heel strike is actually an abrupt change in acceleration. For knowing a single gait in a walk, I have studied the MPU6500 and its attributes, and choose X-accel, Z-accel, Y-gyro these 3 sensors data for referring, also create new csv file for them with the time stamp column.

After processing the data into C++, I create scoreRank1 and scoreRank2 vectors to store the values of dataset1 and dataset2, and using the svm function in dlib library to train, some data (prior thinking of heel strike) should be tagged as relevant and others should tagged as unrelevant.

What I am not sure is the dataset has ambiguous heel strike pattern, it seems to have more than 6 abrupt change in X and Z data, that confused me so I decided to leave 2 variable “j” and “k” for choosing different time period (extra for loop should be added there).

After the train of data, we have a usable algorithm of SVM, so we could simulate a real-time. To read every line of a dataset and rank it when get it. If the rank score is higher than a threshold, it would be judged as heel strike by getting status column “1”.

And now we know the heel strike.

For other periods:

I have also concerned about other period of gait. After recognizing heel trike which is the start of a gait cycle, we could separate our data as gait by gait. And K-means algorithms may be work for separating the gait cycle into several data section, those section maybe recognize as a particular period then.

Also we could use SVM too, but it is a supervised algorithm which needs more ground truth, that is a problem if we want to use it.

Conclusion:

It took me a long time to get familiar with the C++ environment again because I didn’t use it for a long time, but I actually have great interest on Robotics and Machine Learning, so I think this worth it. And I am hoping I could get this coop position.