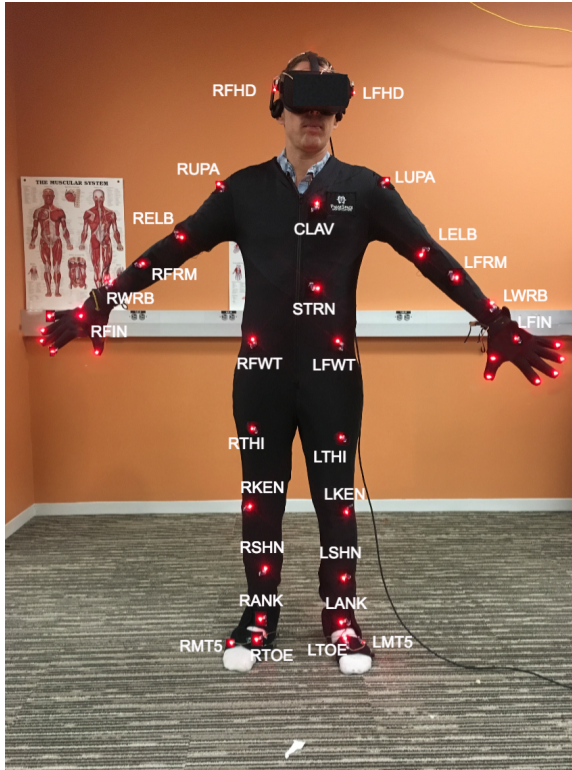

Gaussian Process Programming Assignment

A motion capture suit allows the recording of human movement position data.



When humans contract muscles to move, they can control the stiffness of the movement by co-contracting opposing muscles. It could be very informative if this stiffness could be measured.

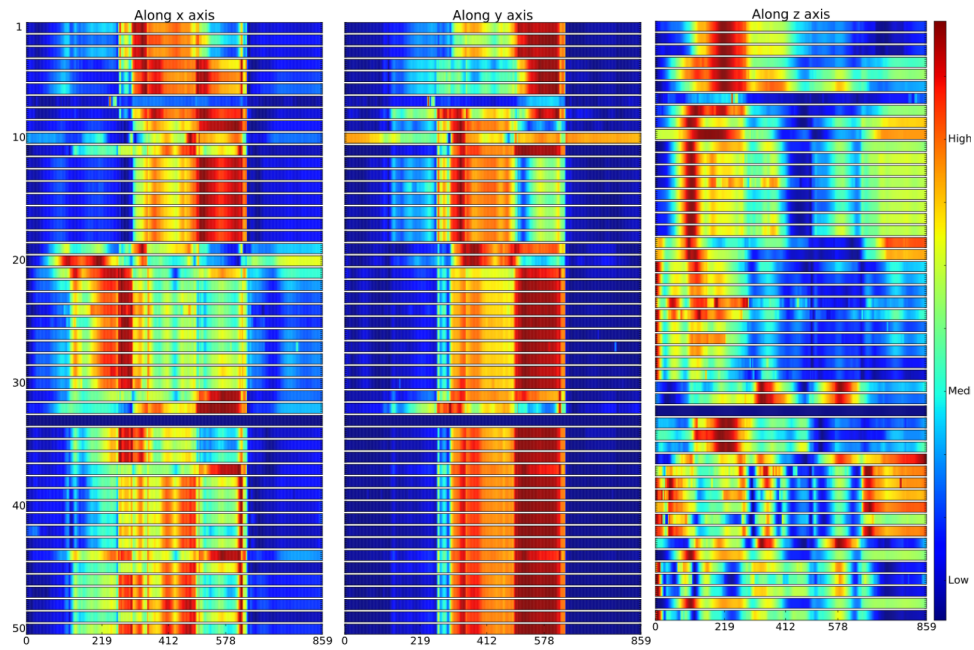
One hypothesis is that if a joint controller is stiff, it will produce reliable repeated movements, whereas if it is very loose, there will be more variation in repeated movements.

The data files have five repeated movements of a subject tracing a square target. As the subject does this the posture changes reflect the fact that different muscles are being used for different tracing segments.

You have 50 separate movement files, each with 5 repeats. For your assignment, you only need to analyse a handful of these traces.

For the Gaussian Process illustrations studied in class, the GP covariance's hyperparameters were fixed, but here the thought is that they produce a better fit to the data if they are allowed to vary for each movement segment.

The following data collection illustrates the issue.



What the figure shows is the 5 tracings of each marker as a function of time, indicated is the number of frames (30f/sec). Your assignment is to use this data in the algorithm for learning the hyper-parameters. Obviously if you had the same hyper-parameters for the entire tracing time, it would derive an average set. To see if a temporally local set would be a better model, you can use a sliding window model.