**MSc 2-week Project Plan (7th – 19th Apr)**

**1.) CRFs/RNNs Papers**

Read and make notes from the following papers

* “Conditional Random Fields: Probabilistic Models for Segmenting and Labeling Sequence Data”
* “Conditional Random Fields as Recurrent Neural Networks”
* “A Comprehensive Study of Activity Recognition Using Accelerometers”
* “Conditional Models for Contextual Human Motion Recognition”
* “Action Categorization with Modified Hidden Conditional Random Field”
* “Conditional Random People: Tracking Humans with CRFs and Grid Filters”
* “Actionness Ranking with Lattice Conditional Ordinal Random Fields”

**2.) Other reading pertaining to CRFs/RNNs and implementing models w/ Python**

* Read from ‘Machine Learning: A Probabilistic Perspective’, Ch. 19 ‘Markov Random Fields’, paying special attention to section 19.6 ‘Conditional Random Fields’
* Read and complete activities from ‘Python Machine Learning’ textbook, chapter 16 ‘Modelling Sequential Data Using Recurrent Neural Networks’
* Read and take notes from ‘Deep Learning’, ch 10 ‘Recurrent Neural Networks’ (URL) <http://www.deeplearningbook.org/contents/rnn.html>
* Read up to clarify more about ‘mean-field approximation’ and how it pertains to undirected models
* Article on ‘Performing Sequence Labelling using CRF in Python’ <http://www.albertauyeung.com/post/python-sequence-labelling-with-crf/>
* Article on ‘Conditional Random Field Tutorial in PyTorch’ <https://towardsdatascience.com/conditional-random-field-tutorial-in-pytorch-ca0d04499463>

**3.) Build basic models and analysis tools from IMU datasets provided**

* Ideally write Python scrips using libraries to visualize the data in some useful way (e.g. matplotlib) and explore usefulness of ML algos w/ scikitlearn for motion-based data
* Add some supervised functionality (e.g. predict one set of (x,y,z) cords from others given)
* Setup github repo for these scripts so rest of the group can follow

**4.) Papers relating to NorthStar scores and DMB**

* ‘The North Star Ambulatory Assessment in Duchenne muscular dystrophy: considerations for the design of clinical trials’
* ‘North Star Ambulatory Assessment, 6-minute walk test and timed items in ambulant boys with Duchenne muscular dystrophy’
* Review resources and make notes from sites such as ‘Duchenne UK’ and ‘Muscular Dystrophy UK’

**5.) Review papers on feature learning using neural networks**

* ‘An Analysis of Single-Layer Networks in Unsupervised Feature Learning’
* ‘Simultaneous Feature Learning and Hash Coding with Deep Neural Networks’
* ‘Discriminative Unsupervised Feature Learning with Convolutional Neural Networks’

**6.) Aggregate and review notes and write up summary of progress made so far**

* Ideally, this will be a good point of reference further on and could form basis of final report intro