

ME 395 - Mechanistic Data Science for Engineering (HW2)

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Project Idea

Musculoskeletal disorders (MSDs) are inflammatory and degenerative conditions that affect the muscles, tendons, ligaments, and peripheral nerves. Previous research has shown that work-related MSD represents one of the leading cause of injuries from modern industries, and accounts for almost 400,000 injuries per year, causing a direct cost of \$20 billion.

My project proposal is to predict worker injury using 3D co-ordinate information of skeleton joints. The goal is to recognize if the worker has been in a dangerous/ awkward position for a time that is long enough to cause muscle injuries to the workers.

The 6 Steps of MDS

3D depth information of 19 joints will be sampled (10 Hz). NuiTrack is an SDK that provides skeleton tracking information. It combines well with the Unity environment to give good visualizations for the skeleton data.



We can extract joint angle features from the coordinate information. Awkward positions can be detected by analyzing the angle data over the time taken to perform the task. Dimensional reduction will be performed by understanding the important angles that affect body posture. Each trial of the task has the data stored in an excel file. We need to analyze each trial and determine whether that subject is at risk of getting injured.

Since this is a time series data, we need a Neural Network that has memory. Recurrent Neural Networks or LSTMs may be an option that can be used for the prediction model.