

Exercise Discrimination using Canonical Correlation Analysis

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Abstract:

Accurately identifying human activities in an interpretable manner is essential for developing automated rehabilitation and sports training systems. This poster proposes a motion classification approach based on Canonical Correlation Analysis(CCA) that can evaluate the relationship between different groups of landmark joints in humans and identify the unique correlation patterns to identify the exercise being performed. Assuming the dependence between joints in each data set, CCA is an efficient method to study these interrelationships. While neural networks have been shown to be effective in classification, they do not give interpretable results.

Exercise data used in this work are obtained from Microsoft Kinect and are in the form of 25 landmark joint locations in the x, y and z dimensions. For analysis these joints are organized into some multivariate data sets. The canonical correlation coefficients are calculated between all possible pairs of data sets for each exercise to study the correlation patterns. The correlation 'heat maps' provide an interpretable result which is the further used for classification. The canonical coefficients are unique for the joint group in each exercise. This can be used to identify and differentiate exercise types. We aim to use the canonical variables for diagnosing faults in exercises.