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Utilizing Data Mining Technologies to Analyze the Physical and Cognitive Benefits of Golf Therapy on Seniors

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Background

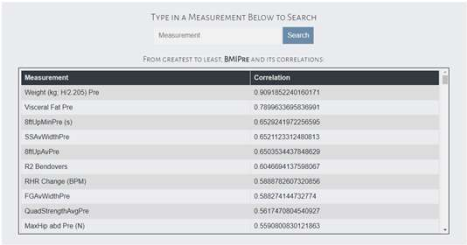
As a person ages, their physiological and cognitive well-being declines. This can be detrimental, not only in the daily physical tasks they may perform, but to their social lives as well. Excessive pain caused by atrophied muscles lowers the quality of life. A group of seniors were selected to participate in a study called Golf for Healthy Aging (GHA). In this initial study, these individuals were put through a variety of tests to determine baseline measurements of their mental and physical health. Over the duration of fourteen days, participants underwent various golf activities. Results from the preliminary study suggests golfing improves seniors' ability to stand and walk, balance, and enhances their strength and cognitive processing capabilities. This study indicates golf may be a helpful tool to combat health declines seniors face as they continue to age.

Introduction

In collaboration with University of Southern California's Division of Biokinesiology and Physical Therapy, we implemented data mining algorithms to help the researchers better understand the data they collected from the GHA study. With the use of correlation methods and implementing clustering algorithms, we discovered trends which could then be used to further explain and improve studies on senior health.

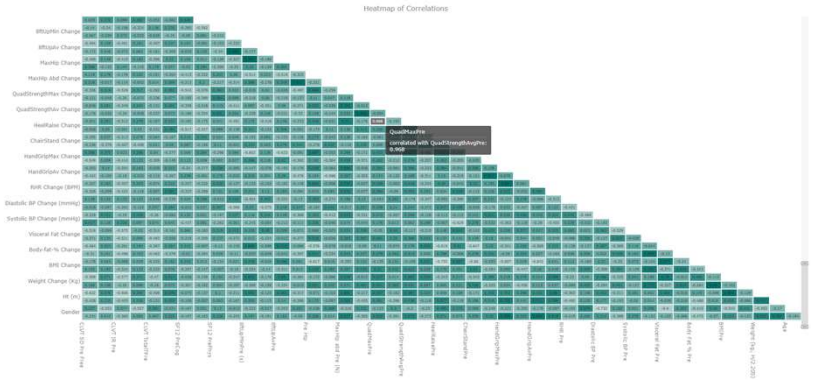
Correlation Search

Our interface shows a list of all the correlation coefficients for both measurements and participants. The table is formatted from greatest to least correlation coefficient. To make the data more accessible, we deployed a search field for the researchers to look up measurements. This tool allows for a convenient way see the corresponding correlation coefficient with the rest of the measurements collected in the study.



Interactive Heatmap

We developed an interactive heatmap which formats the clustered dataset into a table using AnyChart. Each cell in the heatmap displays the correlation value of two measurements. The values in the table range from one to negative one, and as the values get higher, the cell gets darker. Researchers can hover over individual cells and the corresponding correlation coefficient will be displayed.



Algorithm

Using previously correlated data, we implemented a K-means-inspired algorithm which groups data consisting of measurements or participants. The groups are formed based on their correlated value with the selected centroid. Initial centroids are selected randomly, and over many iterations, the best-fit centroids are chosen.

Interactive Clusters

We have created an interactive interface which displays our pre-generated clustering data. Researchers can choose to view between two and ten centroids of either participant or measurement data. These displays run off pre-generated results from our clustering algorithm. Hovering over each node in the cluster group displays the measurement and the corresponding correlation value. The cluster groups are color coded, making it easier to see each distinct cluster and their centroid.