CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

S1425

Project Title

Predicting Future Body Mass Index with an Artificial Neural Network

Abstract

Objectives/Goals

Despite the widely known health risks of obesity, there is no accurate and reliable way to predict if an individual will become obese in the future. The goal of my research was to create an artificial neural network to predict if a person will have a normal, overweight, or obese body mass index over a decade into the future, thus creating an early warning system against obesity.

Methods/Materials

Data was obtained from the British Cohort Study of 1970. A neural network was written in pure Java without using any external libraries or code. It was then tested on the data of 1125 real people in the dataset, and its results were compared to the performance of a logistic regression and support vector machine (two traditional models from the LIBLINEAR machine learning library). The Apache Commons Math Library was used in the computations for the statistical analysis of the results.

Results

Testing for future obesity, the neural network had a conclusively high positive likelihood ratio of 14.7 (95% CI [10.3, 21.2]), while the traditional models inconclusively predicted obesity. Overall, the neural network had the greatest classification success of the three models tested, and its misclassifications were closest to the correct value. A web application was developed to apply the neural network's success in the real world, allowing users to enter their data and obtain a prediction.

Conclusions/Discussion

This research presents the first successful and conclusive prediction tool for future obesity. This is also the first known application of neural networks in adult obesity, demonstrating the superiority of neural networks over traditional models for prediction.

Summary Statement

I created an advanced artificial neural network that is the first successful and conclusive prediction tool for future adult obesity, significantly outperforming traditional models.

Help Received

None.