Predicting Future Body Mass Index with an Artificial Neural Network

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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. Artificial neural networks (ANNs) are capable of finding complex patterns in data, making them highly suitable as a medical prediction tool. The goal of my research was to determine the viability of an ANN to predict if a 26-year old person will have a normal, overweight, or obese body mass index at age 42, thus creating an early warning system against mid-age obesity. To select the most reliable ANN, multiple ANNs were independently trained using data from the 1970 British Cohort Study. The results of the best-performing ANN were compared to the performance of two traditional classification models, a logistic regression and a support vector machine. Testing for future obesity, the ANN had a conclusively high positive likelihood ratio of 14.7 (95% CI [10.3, 21.2]), a significant improvement over both the logistic regression (LR+ = 6.5, 95% CI [5.1, 8.1]) and the support vector machine (LR+ = 5.2, 95% CI [4.3, 6.3]). All three models had inconclusive negative likelihood ratios, but the ANN's misclassifications were the closest to the correct value. This research shows that an ANN is a highly effective obesity prediction tool, providing people with ample time to take preventive measures against midlife obesity. Due to its objective inputs, the ANN does not need medical expertise to be used. To test its high potential for applicability in the real world, the ANN was implemented as a web application for use by the general public, helping in the fight against the obesity epidemic.

Awards Won:

Oracle Academy: Award of $5,000 for outstanding project in the systems software category.