Prediction of health status based on Body Mass Index (BMI)

Introduction

In recent years, the use of advanced technologies, particularly Artificial Intelligence (AI), has shown significant promise in the field of healthcare. One area that has garnered considerable attention is the prediction of Body Mass Index (BMI), which serves as a crucial indicator for evaluating an individual's body status. For our research, we have selected four specific research papers that focus on BMI prediction. Through our examination of these papers, we aim to gain valuable insights into the current state of BMI prediction and identify the problems for improvement.

Problem Statement

The problem at hand is the accurate prediction of health status based on Body Mass Index (BMI). While BMI is a widely used metric to assess an individual's weight status, it does not provide a comprehensive understanding of their overall health. Existing methods for predicting health status based on BMI often lack accuracy and fail to consider other relevant factors such as age, gender, and lifestyle choices. This poses a significant challenge in accurately assessing an individual's health and providing appropriate recommendations for improvement. Therefore, there is a need for an advanced AI-powered solution that can effectively predict health status based on BMI while considering various contextual factors, ultimately enabling personalized and accurate health assessments. Although artificial intelligence (AI) has been used before in many researches, there is still a need for an advanced, comprehensive and less complex prediction model for body mass index (BMI). This model could be created by integrating machine learning, data analytics, and data science techniques. Additionally, some previous work gave promising results and showed BMI can be predicted without measuring weight, height, and BMI together. However, for accurate prediction, these details are essential.

Literature review

A Framework for Healthcare Everywhere: BMI Prediction using Kinect and Data Mining Techniques on Mobiles [Chih-Hua Tai , et. al, 2015]

Accurate prediction of health status based on Body Mass Index (BMI) has become a popular issue. BMI is widely used as an indicator for evaluating body status, but calculating it requires measuring weight and height, which can be inconvenient. This paper addresses the problem of accurately predicting health status based on only seeing facial features and BMI values. The paper has focused on a mobile-based BMI prediction system that utilizes Kinect and data mining techniques. By taking a snapshot of the face, users can easily monitor their BMI everywhere. The system utilizes the correlation between facial features and BMI values, leveraging people's common intuitions in recognizing weight changes based on facial appearance. It consists of a face recognition component for identifying useful face pictures and a BMI predictor that extracts facial features and estimates BMI based on the extracted features Through the evaluation of 50 volunteers, the paper demonstrates the limitations of using only pictures of facial features and a basic BMI predictor, the paper has further highlighted the need for AI technology to improve accuracy and not to fully depend on the system which will predict the BMI just by looking at the facial features.

Recommended Weight Prediction System Based on BMI, BMR, Food Calorie and a Neural Network [Anilkumar Kothalil Gopalakrishnan, 2017]

The research paper proposes a Recommended Weight Prediction System that utilizes Body Mass Index (BMI), Basal Metabolic Rate (BMR), Food Calorie, and a Neural Network. The system aims to predict an individual's recommended weight based on these factors, which can aid in maintaining a healthy weight. By incorporating user inputs such as age, height, weight, sex, and activity level, the system calculates the BMI and BMR. It then considers the food calorie intake to estimate the recommended weight range. To enhance accuracy, a Neural Network model is employed to predict the recommended weight based on the aforementioned parameters. The system's performance is evaluated using a dataset of 150 individuals, demonstrating promising results. The paper highlights the usefulness of this prediction system in guiding individuals towards maintaining a healthy weight.

The Prediction of Body Mass Index from Negative Affectivity through Machine Learning: A Confirmatory Study [Giovanni Delnevo, et al., 2021]

The paper has focused whether Body Mass Index (BMI) values can be predicted accurately using machine learning techniques based on psychological parameters. The study aims to investigate the relationship between psychological variables and BMI, specifically focusing on affect-related variables, such as depression, anxiety, happiness, and emotion regulation. The researchers aim to determine whether these psychological factors play a role as risk (negative affectivity) or protective (positive affectivity) determinants of BMI levels. The problem statement revolves around the prediction of BMI values using machine learning algorithms and exploring the influence of psychological parameters on BMI. The study seeks to address the gap in research by examining the predictive effects of emotional and affective variables on BMI values, which has not been extensively explored in prior investigations utilizing machine learning techniques. The researchers aim to understand whether affect related variables can accurately predict BMI and whether negative affect-related variables have stronger predictive capabilities compared to positive affect-related variables. Additionally, they investigate the impact of removing specific psychological variables, particularly depression, on the predictive capabilities of the machine learning algorithms. The study further aims to provide insights into the role of psychological factors, especially negative affectivity and depression, in BMI prediction.

Predicting obesity rate and obesity-related healthcare costs using data analytics [Stephanie Revelsa, et al., 2017]

This research paper focuses on predicting obesity rates and the associated healthcare costs using data analytics. The authors aim to develop a model that can accurately forecast obesity statistics and estimate the financial burden that obesity places on healthcare systems. They utilize various data sources, such as demographic information and lifestyle factors, to build their predictive model(An Auto Regressive Integrated Moving Average (ARIMA) time series analysis was implemented to model the data published by the Center for Disease Control and Prevention). The study emphasizes the importance of early detection and intervention in obesity management to reduce healthcare costs. The findings of this research can potentially assist

policymakers and healthcare providers in allocating resources effectively and implementing preventive measures.

Conclusion

Despite the use of AI in these papers, there remains a need for an advanced and comprehensive AI-powered prediction model for BMI. This can be achieved by integrating machine learning, data analytics, and data science techniques. And for an accurate prediction, details such as height, weight, and BMI are essential. Therefore, the main objective is to develop an innovative AI-powered model that combines these vital factors for BMI prediction. By utilizing data sources which have details of gender, height, weight and indexes, we can predict accurately using data analytics, machine learning and data science techniques. This solution could be especially beneficial for people who are at risk for chronic diseases, such as heart disease, stroke, and diabetes.