Body Fat Estimator Using Ensemble Methods

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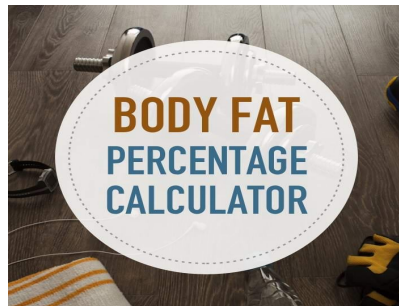**BVRIT HYDERABAD College of Engineering for Women**

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Overview

Introduction

- Obesity or excessive body fat is a critical public health problem that can cause several health issues like mood disorders, cardiovascular diseases, respiratory aliments, and digestive issues.

Literature Survey

S. No	Title of the paper	Author(s)	Description
1	Body Fat Prediction using Various Regression Techniques	Nikhil Mahesh, Peeta Basa Pati, K. Deepa, Suresh Yanan - 2023	In this paper, they compare the performance of several machine learning models based on Regression, to predict the body fat percentage.
2	Classification of Obesity Using Several Machine Learning Techniques	Jyothi Parsola - 2022	The 3D Scanner techniques like Computed Tomography is used for determining the body fat percentage.

Literature Survey

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3	Hybrid Machine Learning Model for Body Fat Percentage Prediction Based on Support Vector Regression and Emotional Aritificial Neural Network	Solaf A. Hussain, Nadire Cavus, Boran Sekeroglu - 2021	In this paper, they have used the data selection technique the "left-out" approach and integrated the physical and emotional characteristics for body fat prediction.
4	Prediction of Women Obesity using Naive Baye's Algorithm	Dr. Naveen N, Rakshitha Kiran P - 2019	The Naive Baye's Algorithm is used and Women dataset is collected, based on the risk factors the algorithm worked to predict the body fat percentage.

Problem Statement

- Body fat estimator using ensemble methods for accurate predictions with basic user inputs like age, gender, weight, measurements and calculate the body mass index for facilitating personalized health management and fitness planning .

BODY FAT PERCENTAGE MEN

10% 20% 30% 40% 50%
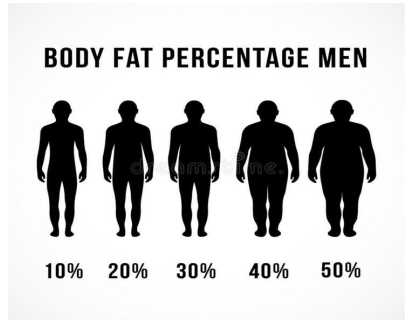
Proposed Method

- Developing a novel machine learning model that integrates SVR(Support Vector Regression), Random Forest and boosting algorithms (AdaBoost, Gradient Boosting Machine, XG-Boost) for precise and cost-effective body fat percentage prediction.
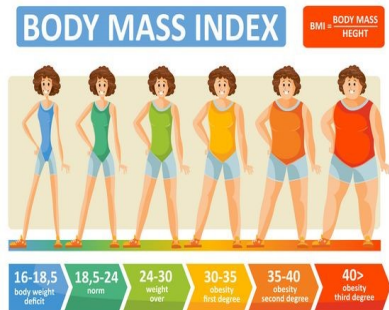
Modules

- **Support Vector Regression :** Support Vector Regression (SVR) is a machine learning algorithm used for regression tasks, to predict a continuous target variable.

- **Random Forest :** Random forest is a meta estimator that fits a number of decision tree classifiers on various sub-samples of the dataset and uses averaging to improve the predictive accuracy.

- **AdaBoost (Adaptive Boosting) :** The final prediction is made by a weighted sum of the individual weak learner predictions.

- **XGBoost (Extreme Gradient Boosting):** It incorporates regularization techniques, parallel processing, and a custom loss function to improve model performance.

Implementation

Description	Status
Impoting necessary packages, Collecting and loading data set, data preprocessing	Done
Ensemble creation and Visualization	Yet to be done.

References

- Nikhil Mahesh, Peeta Basa Pati, K. Deepa, Suresh Yanan "Body Fat Prediction using Various Regression Techniques", in IEEE International Conference on Advances in Computing, Communication and Applied Informatics(ACCAI), Aug 2023.
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- Solaf A. Hussain, Nadire Cavus, Boran Sekeroglu "Hybrid Machine Learning Model for Body Fat Percentage Prediction Based on Support Vector Regression and Emotional Artificial Neural Networks", Volume 11, https://doi.org/10.3390/app11219797
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Thankyou