
SMART
BURN:
AI-Based Calorie
Burn Prediction

Team Members:

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Project Title:

SmartBurn: AI-Based Calorie Burn Prediction.

Introduction:

In today's world, where health and fitness awareness continues to grow, tracking the number of calories burned during physical exercise has become an essential component of maintaining a healthy lifestyle. Many individuals rely on wearable devices such as FitBit or smartwatches to estimate the calories they burn; however, these devices are often expensive or not easily accessible to everyone.

The SmartBurn project aims to provide an intelligent and accessible alternative by utilizing Machine Learning (ML) algorithms to predict the number of calories burned based on exercise data such as duration, heart rate, weight, and gender. This approach offers a more accurate and convenient method for monitoring physical activity without the need for costly hardware or specialized fitness devices.

Problem Statement:

Most existing calorie tracking systems rely on wearable smart devices or advanced gym equipment, which are often expensive and not available in every fitness center.

Even when such devices are available, they may not provide personalized or accurate results for every user due to differences in body composition, fitness level, and exercise intensity.

Additionally, manual calorie estimation methods depend on general formulas that overlook individual variations and specific workout types.

Therefore, there is a growing need for an intelligent, data-driven system that can accurately predict calorie burn based on workout data — providing gym users, trainers, and fitness enthusiasts with reliable feedback without the need for costly equipment or manual input.

Objectives:

The main objectives of the SmartBurn project are as follows:

1. **Develop a Machine Learning model capable of accurately predicting the number of calories burned based on user-specific physiological data such as duration, heart rate, body temperature, weight, gender, and age.**
2. **Collect, preprocess, and analyze fitness data to identify the most influential features that affect calorie expenditure and improve model precision.**
3. **Compare the performance of multiple regression algorithms (e.g., Linear Regression, Random Forest, XGBoost) to select the most accurate and efficient model.**
4. **Design a prototype system that can later be integrated into a smart fitness application or used by gyms and trainers to provide real-time calorie predictions and insights.**
5. **Enhance user awareness and motivation by offering data-driven feedback that helps users monitor their calorie burn and achieve their fitness goals effectively.**

Related Works:

1. **Burned Calories Prediction using Supervised Machine Learning: Regression Algorithm**
   IEEE – Second International Conference on Power, Control and

Computing Technologies (ICPC2T 2022)
IEEE Xplore

2. **One noteworthy study titled "A Study on Calories Burnt Prediction Using Machine Learning" employs over 15,000 records to train models using algorithms such as XGBoost, Decision Trees, SVR, Linear Regression, and AdaBoost Regressor. The authors report an MAE of 1.48, demonstrating relatively strong predictive performance. (www.itm-conferences.org)**
   This work supports the feasibility of estimating calories burned using physiological and temporal features and illustrates the value of comparing multiple regression methods.

3. **The paper *"An Innovative Deep Neural Network Model for Precise Calorie Burn Prediction from Physical Activity Data"* introduces a deep learning model (MLP, Leaky ReLU, dropout, Adam optimizer) for calorie prediction achieving exceptional accuracy (MAE ~ 0.27%, accuracy ~ 99.73%). ojs.unikom.ac.id+1**