MACHINE LEARNING — FITNESS PREDICTION & WORKOUT RECOMMENDATION

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Introduction & Data

Problem. Individuals lack personalized, goal-aware feedback to optimise fitness. We address this with an Machine Learning (ML) pipeline that predicts calories/weight and recommends workouts.

Objectives. Predict **Calories Burned**, forecast **Future Weight**, and recommend an optimal **Workout Type**.

Data & Preprocessing

Dataset. Synthetic gym-tracking data (1800 rows): demographics, session duration, heart rate, basic metrics.

Preprocessing. Cleaning, imputation, BMI → goal buckets, scaling and feature engineering.

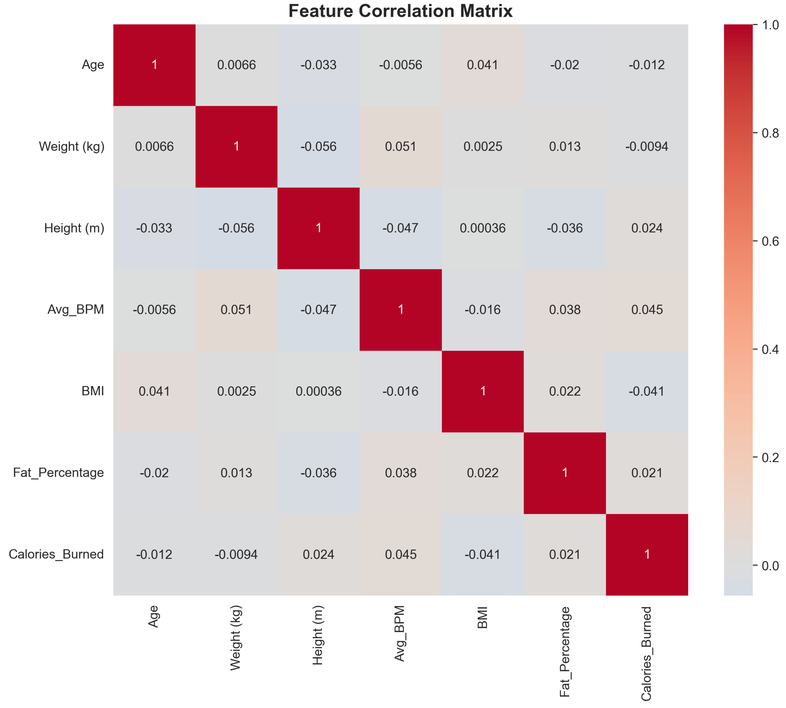

Figure 1: Correlation: Calories, Duration, Avg BPM.

Methodology

Reproducible Scikit-learn pipeline: preprocessing, CV, hyperparameter tuning, and model comparison. Ensembles prioritized.

Models (summary)

- Gradient Boosting — main regressor/classifier.
- SVR / SVM — non-linear baseline.
- Linear / Logistic Regression — lightweight baselines.

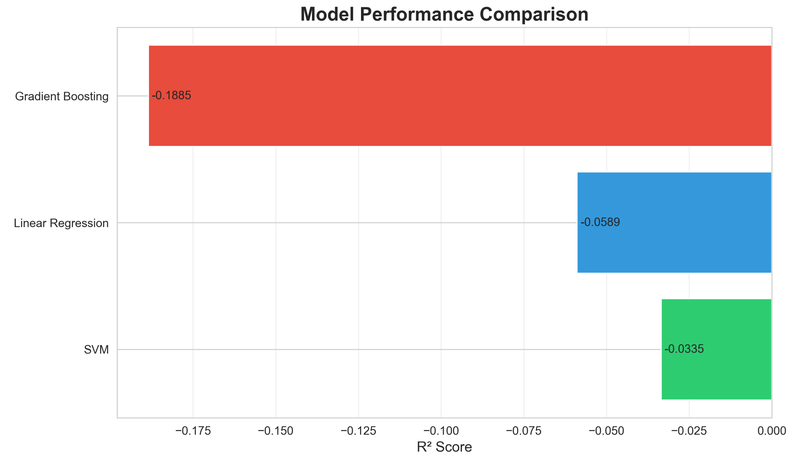

Figure 2: Model comparison (R^2 / Accuracy).

Results & Demo

Performance (final GB models)

Task	Metric
Calorie Prediction	$R^2 = 0.8615$, **RMSE** = 31.31 **Kcal**
Weight Prediction	$R^2 = 0.8123$, **RMSE** = 1.37 **kg**
Workout Recommendation	**Accuracy** = 88.0%, **F1** = 0.87

Frontend Demo

Live UI shows recommendations with confidence and suggested adjustments.

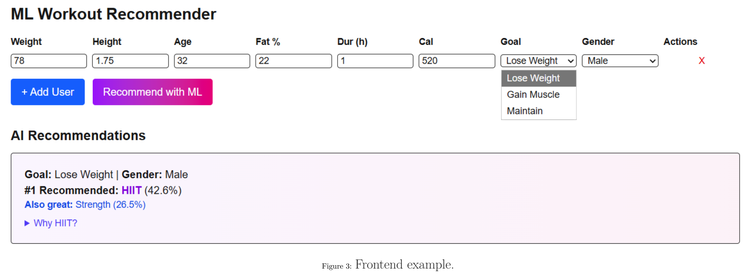

Figure 3: Frontend example.

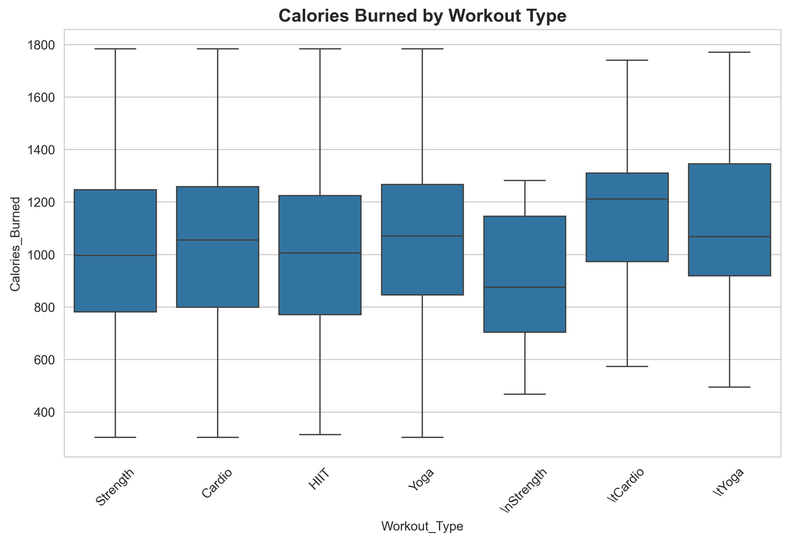

Figure 4: Dynamic weekly planner reallocation.

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References
GitHub: github.com/akramnemri/ML_Fitness_Project
Dataset: Gym Tracking Data (Synthetic)

Deployment & Demo
https://huggingface.co/spaces/Hushfire/fitness-ai

Live API / Demo