WORKOUT QUALITY PREDICTION

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Which variables are the best predictor of a successful workout?

The Question
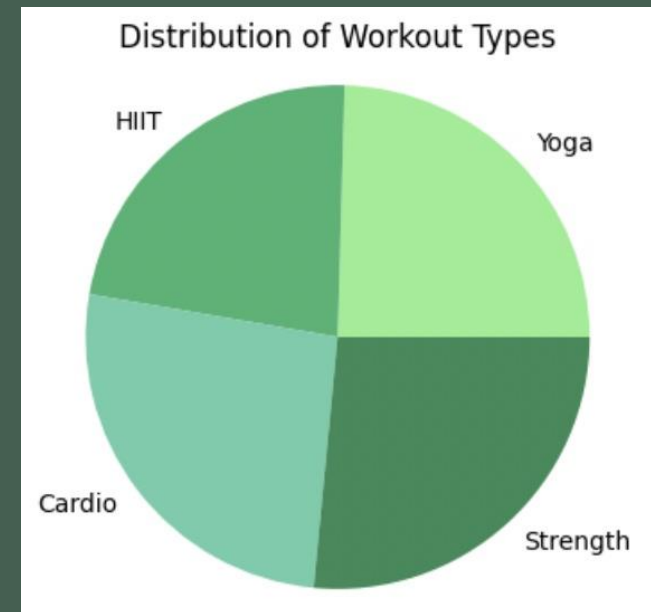
The Data Set

The Data Columns

- Age
- Gender
- Weight
- Height
- max bpm

- average bpm
- BMI
- resting bpm
- calories burned
- workout type

- session duration
- workout frequency
- experience level
- water intake during workouts
- fat percentage

|	Age	Gender	Weight (kg)	Height (m)	Max_BPM	Avg_BPM	Resting_BPM	Session_Duration (hours)	Calories_Burned	Workout_Type	Fat_Percentage	Water_Intake (liters)	Workout_Frequency (days/week)	Experience_Level	BMI
0	56	Male	88.3	1.71	180	157	60	1.69	1313.0	Yoga	12.6	3.5	4	3	30.20
1	46	Female	74.9	1.53	179	151	66	1.30	883.0	HIIT	33.9	2.1	4	2	32.00
2	32	Female	68.1	1.66	167	122	54	1.11	677.0	Cardio	33.4	2.3	4	2	24.71
3	25	Male	53.2	1.70	190	164	56	0.59	532.0	Strength	28.8	2.1	3	1	18.41
4	38	Male	46.1	1.79	188	158	68	0.64	556.0	Strength	29.2	2.8	3	1	14.39
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
968	24	Male	87.1	1.74	187	158	67	1.57	1364.0	Strength	10.0	3.5	4	3	28.77
969	25	Male	66.6	1.61	184	166	56	1.38	1260.0	Strength	25.0	3.0	2	1	25.69
970	59	Female	60.4	1.76	194	120	53	1.72	929.0	Cardio	18.8	2.7	5	3	19.50
971	32	Male	126.4	1.83	198	146	62	1.10	883.0	HIIT	28.2	2.1	3	2	37.74
972	46	Male	88.7	1.63	166	146	66	0.75	542.0	Strength	28.8	3.5	2	1	33.38

Things to Consider…

- What does a successful workout look like? Are we looking just at calories burned or the intensity of the session on cardiovascular health? Should we consider the possible goals of the person working out?
  - Successful workout = higher amount of calories burned per session
  - How to change the data: Strength and yoga data will be excluded from this prediction model.
    - The focus of these exercises is not directly on burning calories.
      - Yoga focuses on mindfulness, flexibility, and balance
      - strength training, while it can burn calories, also has other factors like your muscle growth and calories burned outside of your workout

Distribution of Workout Types

HIIT
Yoga
Cardio
Strength

Confusion Matrix Heatmap
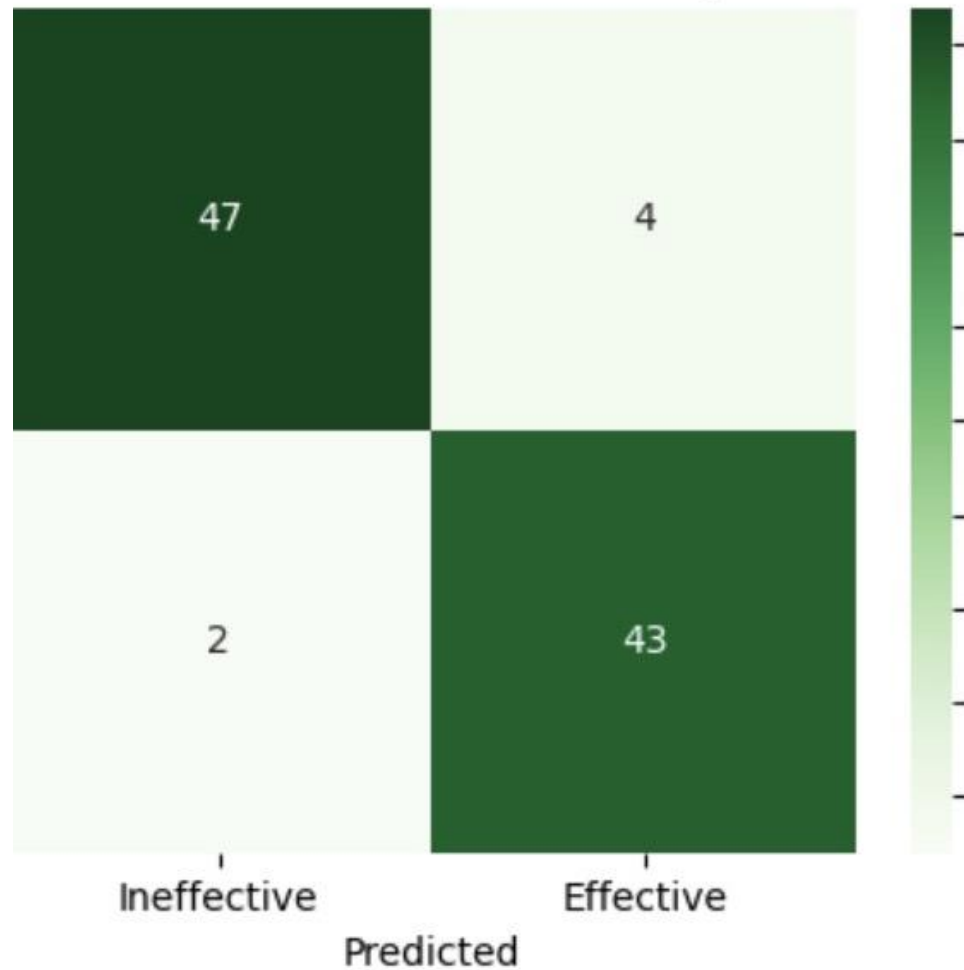
The Model

- I used a linear regression model to best predict if a workout was successful based on the dataset. The accuracy of the model is displayed below:

- Data Handling and Analysis:
  - Pandas: data frames and tables
  - Numpy: matrices and arrays
- Visualization
  - Matplotlib: graphs and charts
  - Seaborn: heatmaps
- Machine Learning
  - Sklearn: model training & testing, data preprocessing, modeling, and evaluation metrics

Python Libraries Utilized

Top Predictors of Workout Effectiveness
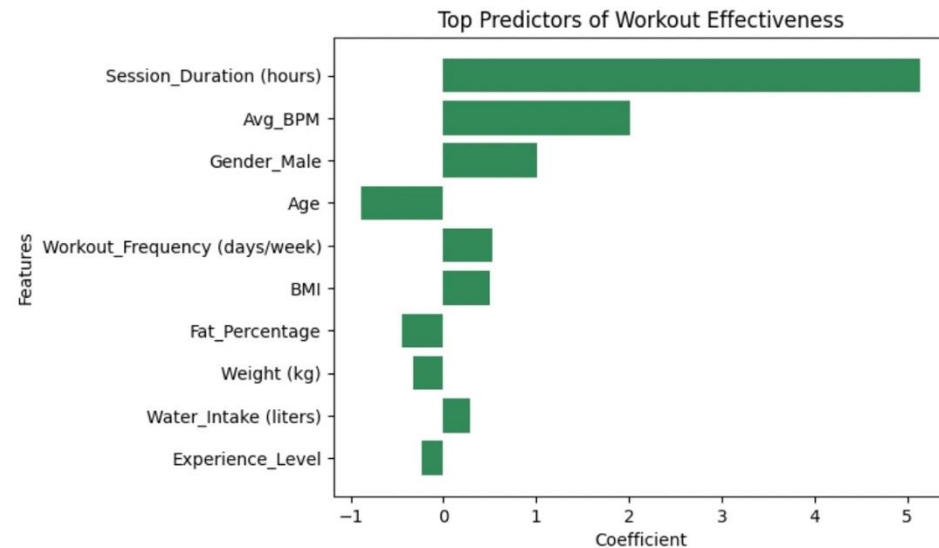
The Results

- Top predictors: session duration in hours and average BPM (average intensity).

- Gender Male: "Men usually have less body fat and more muscle than do women of the same age and weight. That means men burn more calories" (https://www.mayoclinic.org/healthy-lifestyle/weight-loss/in-depth/metabolism/art-20046508)

- Workout Frequency, BMI, and water intake: All of these features showed some correlation to a successful workout.

- Negative coefficient: Age, fat percentage, weight, and experience level all play no impact in predicting a successful workout.

Uses for this Model

- Goals: demonstrate how my findings could be used to create something that is useful to someone in the everyday life.

```
#Demonstration of the model in action
my_good_workout = pd.DataFrame({'Age': [19],'Gender': ['Female'],'Weight (kg)': [75],'Height (m)': [1.78],'Max_BPM': [200],'Avg_BPM': [180],'Resting_BPM': [77],'Session_Duration (hours)': [1.2],
                    'Workout_Type': ['Cardio'],'Fat_Percentage': [25.0],'Water_Intake (liters)': [0.5],'Workout_Frequency (days/week)': [5],'Experience_Level': [2],'BMI': [23.7]})
#A typical workout for me
pred_good_class = model.predict(my_good_workout)
print("Predicted Effective Workout:", "Yes" if pred_good_class[0] == 1 else "No")


#reduced time 1 hour and decreased the intensity/average bpm to make the workout worse according to the values that will make a workout worse.
my_bad_workout = pd.DataFrame({'Age': [19],'Gender': ['Female'],'Weight (kg)': [75],'Height (m)': [1.78],'Max_BPM': [180],'Avg_BPM': [120],'Resting_BPM': [77],'Session_Duration (hours)': [0.2],
                    'Workout_Type': ['Cardio'],'Fat_Percentage': [25.0],'Water_Intake (liters)': [0.5],'Workout_Frequency (days/week)': [5],'Experience_Level': [2],'BMI': [23.7]})
pred_bad_class = model.predict(my_bad_workout)
print("Predicted In-Effective Workout:", "Yes" if pred_bad_class[0] == 1 else "No")


Predicted Effective Workout: Yes
Predicted In-Effective Workout: No
```

Difficulties and Complications

What workout types should be considered? How to define a successful workout?

Analyzing my results: gender male being a strong predictor of workout success.