Strava Fitness Data Analytics Project

Project Type

Exploratory Data Analysis (EDA)

Tools Used

- Python
- Pandas
- Matplotlib
- Seaborn

Dataset

Strava / Smart Device Fitness Activity Data

Objective

The objective of this analysis is to explore fitness activity data collected from smart devices in order to understand user behavior patterns related to steps taken, calories burned, and activity intensity. The insights from this analysis help identify activity trends and support data-driven fitness and wellness recommendations.

Data Loading and Preprocessing

- Loaded the dataset using Pandas.
- Inspected the dataset structure using .head(), .info(), and .describe().
- Checked for missing values and data inconsistencies.
- Converted date-related columns into appropriate datetime formats.
- Ensured numeric columns were correctly typed for analysis.

Exploratory Data Analysis (EDA)

1. Daily Activity Overview

- Analyzed total steps recorded per day.
- Observed variability in daily activity levels across different dates.
- Identified average daily step count to understand baseline activity.

Insight:
Users show moderate daily activity levels, indicating consistent engagement with fitness tracking.

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2. Calories Burned Analysis

- Calculated average daily calories burned.
- Analyzed distribution of calorie expenditure.
- Compared calories burned with step count patterns.

Insight:
Higher step counts generally correspond to higher calorie expenditure, indicating a strong relationship between physical movement and energy burn.

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3. Weekly Activity Patterns

- Extracted day names from activity dates.
- Analyzed average steps taken on each day of the week.
- Identified trends in weekday vs weekend activity.

Insight:
Activity levels tend to vary by day of the week, with certain days showing higher engagement, suggesting lifestyle-driven fitness behavior.

4. Activity Consistency

- Evaluated consistency of user activity over time.
- Observed fluctuations and spikes in daily steps.
- Identified potential high-activity and low-activity periods.

Insight:
While users maintain overall consistency, occasional spikes indicate specific days of increased motivation or planned physical activity.

Visual Analysis

The following visualizations were created to support insights:

- Line plots for daily step trends
- Bar charts for average steps by day
- Distribution plots for calories burned
- Comparative plots between steps and calories

These visualizations helped in clearly identifying behavioral patterns and trends.

Key Business Insights

- Users maintain a moderate level of daily physical activity.
- Calorie burn increases significantly with higher step counts.
- Certain days of the week show higher activity levels.
- Consistency exists, but motivation-driven spikes are noticeable.

Recommendations

- Encourage users to maintain consistency on low-activity days.
- Introduce fitness challenges on low-engagement weekdays.
- Promote step-based goals to increase calorie burn.
- Use personalized insights to boost motivation and adherence.

Conclusion

This Python-based exploratory data analysis successfully uncovered meaningful patterns in fitness activity data. The insights derived from steps, calories, and weekly activity trends provide a strong foundation for improving user engagement and promoting healthier lifestyles through data-driven fitness strategies.