**Using the Fitbit Web API with Python, MongoDB**

**and Streamlit**

Diagram

Description automatically generatedA Beginner's Guide for Storing and Visualizing FitBit data

*Photo from* [*FitBit*](https://www.fitbit.com/dev) *site*

In today's data-driven world, the ability to collect, store, and analyze data has become more critical than ever before. Public APIs offer an excellent way to acquire data from various sources, and the Fitbit Web API is a perfect example of this.

It provides access to a wealth of fitness-related data, including step counts, heart rate, and sleep patterns, making up a rich source of information for developers, data scientists, and fitness enthusiasts.

In this tutorial, we will explore how to use the Fitbit Web API to acquire data, store it in a NoSQL database and visualize it on a web platform using [Streamlit](https://streamlit.io/), an open-source Python library for building beautiful custom web apps for machine learning and data science.

With this tutorial, you will learn how to extract insights from your fitness data and create a custom dashboard that displays your progress over time. Whether you are a fitness enthusiast or a data scientist, this tutorial is a valuable resource for anyone interested in working with Fitbit Web API data.

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**Creating a Fitbit developer account and registering an application**

The wearable that was used to collect fitness data from Fitbit Web API is **Fitbit Sense 2**, a health and fitness-based smartwatch.

Before starting data collection, we need to follow some steps, which are based on this [tutorial](https://towardsdatascience.com/using-the-fitbit-web-api-with-python-f29f119621ea).



*Fitbit Sense 2*

Firstly, we must create a Fitbit account from [here](https://accounts.fitbit.com/signup?targetUrl=https%3A%2F%2Fwww.fitbit.com%2Fglobal%2Fus%2Faccount). Just use a valid email and a password.

Graphical user interface, text, application, email

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After you successfully create an account, go to [dev.fitbit.com](https://dev.fitbit.com/getting-started/) and from the upper right corner of the page, select **Manage/Register An App.**

You will see a page like the below one (taken from the tutorial we attached before):

Graphical user interface, application

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You need to specify **Personal** Application Type to be able to ask to download intraday data. The callback URL is http://127.0.0.1:8080 because the Python API we will use has it as the default redirect URL.

Next steps are pretty straightforward, so we will not mention them here. As mentioned in the tutorial, keep in mind to write down the CLIENT\_ID and CLIENT\_SECRET provided during the registration, as there are useful for the next step.

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**API authorization in Python**

Fitbit authorizes users and authenticates API calls using OAuth 2.0. The OAuth 2.0 framework requires your application to obtain your own Access Token when the Fitbit user authorizes your app to access their data. The Access Token is used for making HTTPS requests to the Fitbit API.

The authorization process is enabled by the Python code below

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After authorization and login, the page should appear as shown.

A screenshot of a computer

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**API requests for data acquisition**

Fitbit Web API provides a wide range of [endpoints](https://dev.fitbit.com/build/reference/web-api/), including exercise details, activities summary (calories, steps, distance covered etc.), heart rate, sleep measures and many other interesting health categories.

For this tutorial, we will acquire data for **Sleep & User Engagement**. The code we used is the following:

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where **base\_date** and **end\_date** specifies the data range in which we retrieve the data from Fitbit API and **activity** is the activity types, which include in our case:

|  |  |
| --- | --- |
| *activities-minutesSedentary* | *activities-heart* |
| *activities-minutesLightlyActive* | *activities-steps* |
| *activities-minutesFairlyActive* | *sleep* |
| *activities-minutesVeryActive* |  |
|  |  |

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**Data storage in MongoDB**

We built 3 main functions to get the information we need from the API response. In all these functions, for each metric we collect data for, we create a new dictionary with a random hash ID, the metric type, and the metric value for that day. We use a NoSQL database, the famous MongoDB. This is a document-based database, which uses JSON-like (BSON) documents to store data. You can download MongoDB from [here](https://www.mongodb.com/try/download/community) and then, we recommend you to use [MongoDB Compass](https://www.mongodb.com/products/compass) or [Studio 3T](https://studio3t.com/) for visualizing the contents.

The following code is used to transform the data in the above-mentioned form.

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Figure : create\_data function

Then, we insert each new dictionary into a MongoDB collection within a MongoDB database. An example of the data we acquire looks like that:

A screenshot of a computer

Description automatically generated with low confidence

The first function used to get data from Fitbit API is the ***getSleepData( ).*** It retrieves the sleep data for each day, within the date range, and for each main sleep session on that day, it extracts various sleep metrics such as sleep duration, start time, minutes spent in deep, light, REM, and wake sleep stages etc.

A screen shot of a computer code

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Figure : Part of getSleepData() function

The other two are ***getActivityData( )*** and ***getStepsData( )*** functions and we use them to get insights on the engament of the user.

The ***getActivityData()*** function retrieves activity data from the Fitbit API for a specified date range and activity types. The activity types include sedentary minutes, lightly active minutes, fairly active minutes, very active minutes, and heart rate. The function then loops through the date range and creates new data entries for each type of activity. It also creates a new data entry for the total wear time for the day.

A screenshot of a computer code

Description automatically generated with low confidence

Figure : Part of getActivityData() function

The ***getStepsData()*** function retrieves the step count data from the Fitbit API for a specified date range. It then loops through each item in the step count data and gets the steps count data for the current date. If the number of steps for a date is over 10,000, it adds the date to a list of highly active days.

A screenshot of a computer program

Description automatically generated with low confidence

Figure : getStepsData() function

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**Setting up a Streamlit website with Python**

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**Visualizations with Streamlit for understanding Fitbit data**

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**Insightful conclusions**

*I hope you find this tutorial useful. Please let us know if you have any thoughts or concerns.*

*Thanks for reading!*