Application Programming Interface (API)

Hello!
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I am a Data expert with extensive experience in multiple industries such as marketplace, insurance, banking, general taxation, consulting, and training.
In total, I trained more than 300 data scientists, engineers, and analysts.

Quote of The Day

The best way to find yourself is to lose yourself

in the service of others

- Mahatma Gandhi

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Let's Imagine...

Imagine you are sitting in a restaurant's table with a menu of choices to order from. And a kitchen which will prepare your order. One thing is missing, who will receive your order and how the food will be delivered to you?

That's where the waiter comes in. The waiter is a messenger of your order and delivers your request to the kitchen. When the your favorite food is ready, waiter sends it back to you.

This situation exactly the same as how API works.
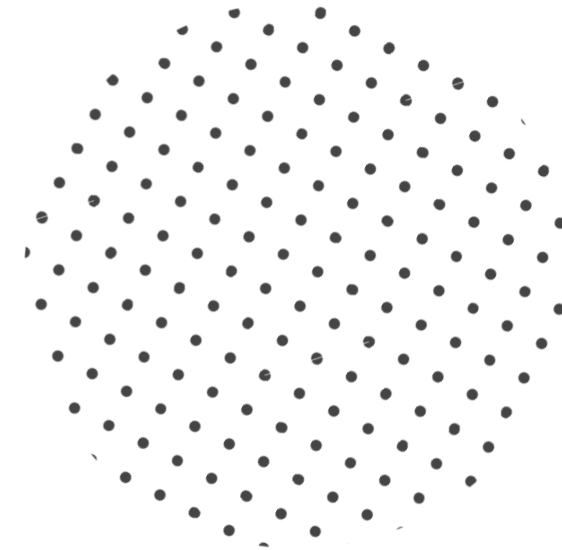
What is API?

API is the acronym for Application Programming Interface, which is a software intermediary that allows two applications to talk to each other.

An API is a messenger that takes request and tells a system what you want to do, and then return the response back to you.

Each time you use an app like Facebook, send an instant message, or check the weather on your phone, you're using an API.

Example of API

Example of API

Example of API

Benefit of API

- **Automation:** with APIs, computers rather than people can manage the work. Through APIs, agencies can update work flows to make them quicker and more productive.

- **New data available:** an API allows all of the information generated at the government level to be available to every citizen, not just a select few.

- **Integration:** APIs allow content to be embedded from any site or application more easily. This guarantees more fluid information delivery and an integrated user experience.

- **Personalization:** through APIs any user or company can customize the content and services that they use the most.

API Data Format

JSON

{...}

XML

<...>

JSON

Many new APIs have adopted JSON as a format because it's built on the popular Javascript programming language, which is ubiquitous on the web and usable on both the front- and back-end of a web app or service. JSON is a very simple format that has two pieces: keys and values. Keys represent an attribute about the object being described. A pizza order can be an object. It has attributes (keys), such as crust type, toppings, and order status. These attributes have corresponding values (thick crust, pepperoni, and out-for-delivery).

key   value

{ "crust": "original" }

XML

XML has been around since 1996. With age, it has become a very mature and powerful data format. Like JSON, XML provides a few simple building blocks that API makers use to structure their data. The main block is called a node.

XML always starts with a root node, which in our pizza example is "order." Inside the order are more "child" nodes. The name of each node tells us the attribute of the order (like the key in JSON) and the data inside is the actual detail (like the value in JSON).

node opening tag   value   node closing tag

original

API in Python

Python is a powerful language that can create and request API. There are popular python libraries which is made solely for API, for example requests, flask, fastapi, django, etc.

But for this lesson we will not create any API since it needs deeper understanding about how backend works.

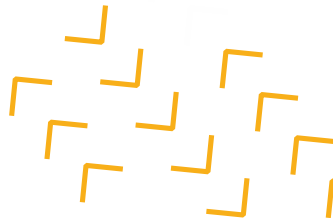We will learn how to get data from API. The library that we are going to use is requests.

Flask

Requests
http for humans

django

The Roles of HTTP, APIs, and REST

An Application Programming Interface (API) is a web service that grants access to specific data and methods that other applications can access – and sometimes edit – via standard HTTP protocols, just like a website. This simplicity makes it easy to quickly integrate APIs into a wide variety of applications.

REpresentational State Transfer (REST), is probably the most popular architectural style of APIs for web services. It consists of a set of guidelines designed to simplify client / server communication. REST APIs make data access much more straightforward and logical.
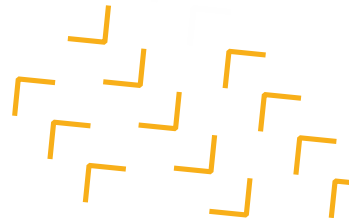
Component of API

Endpoint – The URL that delineates what data you are interacting with. Similar to how a web page URL is tied to a specific page, an endpoint URL is tied to a specific resource within an API.

Data – If you're using a method that involves changing data in a REST API, you'll need to include a data payload with the request that includes all data that will be created or modified.

Headers – Contain any metadata that needs to be included with the request, such as authentication tokens, the content type that should be returned, and any caching policies.
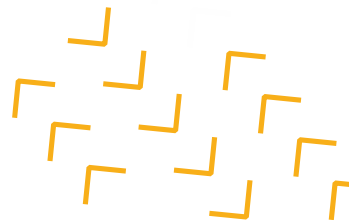
Component of API (2)

Method – Specifies how you're interacting with the resource located at the provided endpoint. REST APIs can provide methods to enable full Create, Read, Update, and Delete (CRUD) functionality. Here are common methods most REST APIs provide:

- GET – Retrieve data

- PUT – Replace data

- POST – Create data

- DELETE – Delete data

API Statuses

HTTP response status codes indicate whether a specific HTTP request has been successfully completed. Responses are grouped in five classes:

1. Informational responses (`100`–`199`)

2. Successful responses (`200`–`299`)

3. Redirects (`300`–`399`)

4. Client errors (`400`–`499`)

5. Server errors (`500`–`599`)

How to request from API

```python
import requests

response = requests.get('http://api.open-notify.org/astros.json')
print(response)
response.content() # Return the raw bytes of the data payload
response.text() # Return a string representation of the data payload
response.json() # This method is convenient when the API returns JSON
```
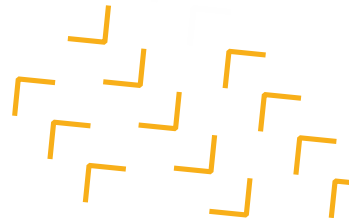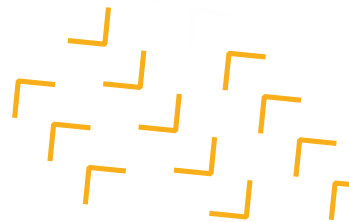
API Data Processing

After getting the data from API, we need to process the data, in order to be useful for our analysis.
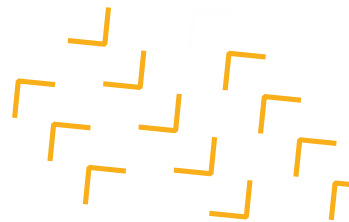
1. Looping

2. Pandas Cross Join

Alphavantage API

Alphavantage is a stock price provider website where we can get any stock data from any country for free. This service is very useful when it comes to stock price analysis, because it also provides popular technical analysis such as moving average, MACD, Stochastic oscillator, etc.

Let's get data from it!

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