Programming Leson 03: APIs & Data Storage

The MATLAB files for this section can be found at this link.

The link above contains the live scripts for both coding sections, as well as a PDF of the PowerPoint if you wish to follow along.

Objectives

- Students will understand how **Application Programming Interfaces (APIs)** allow computers to obtain data.
- Students will create a **datastore** to organize data in MATLAB®.
- Students will understand **basic sorting, data storage,** and how to **omit missing data**.

Main Learning Goal

Students will learn what APIs are and how they play a pivotal role in obtaining data. They will gain hands-on experience working with APIs by using the Spotify API. Students will also learn the basics of sorting and data storage in MATLAB®.

Focus Question

How do computers obtain data?
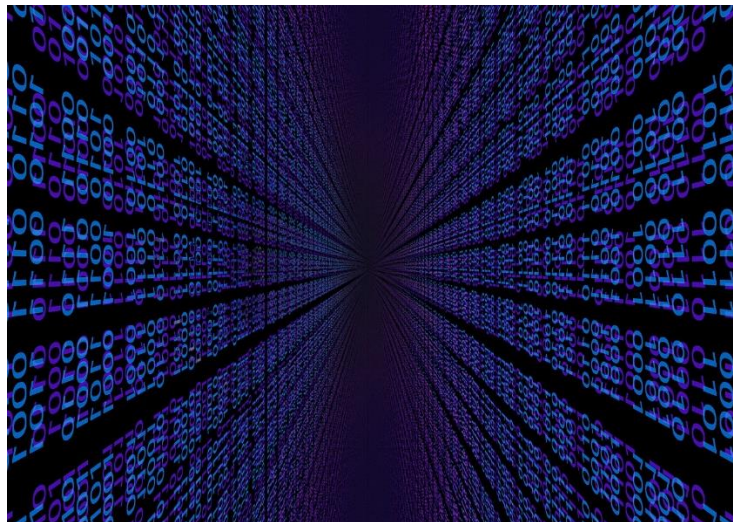
"Binary blue image" by geralt is licensed under CC0 1.0 DEED

Gathering and Organizing Data

In the previous lesson, we learned that machine learning models require data to make predictions and inferences. Exercises in lesson 2 required the user to import the data manually into MATLAB®; however, this method becomes increasingly inefficient when dealing with large amounts of data.

Get into groups and let's discuss the following questions:

1. How do data scientists gather large amounts of data?
2. How do you think that apps on your smartphone get data?
3. Why must data be organized and sorted?

Relate your answers to your experiences.

Hint: Think about the apps used in your daily life and how those apps are organized. For example, Spotify allows the user to sort through music according to genre, artist, and popularity.
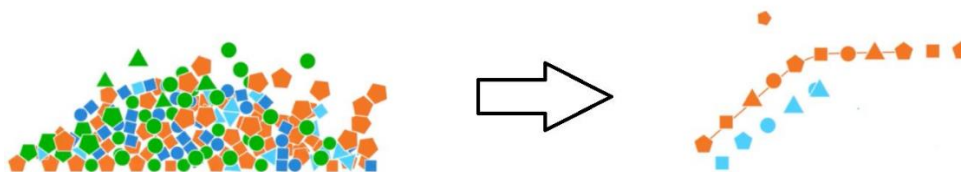
"Data Wrangling organizes messy data into a useful format" by ChrisJen517 is licensed under CC BY-SA 4.0

After discussing the questions above let's introduce some key concepts for this lesson.

1. Data scientists obtain large amounts of data from various sources using a combination of techniques and tools. Some of the most common ways include application programming interfaces (APIs) and Web scraping. The focus of this lesson will be APIs.
2. APIs are mechanisms that enable 2 software components to communicate with each other using a set of definitions and protocols. One application of APIs is weather apps. The app (client) communicates with a weather database (server) via APIs to provide the user with weather updates.

Collecting and Managing Data

Please copy over the files for Section 03 from the MATLAB Drive

The files can be found from the link given at the top of the handout: [click here]
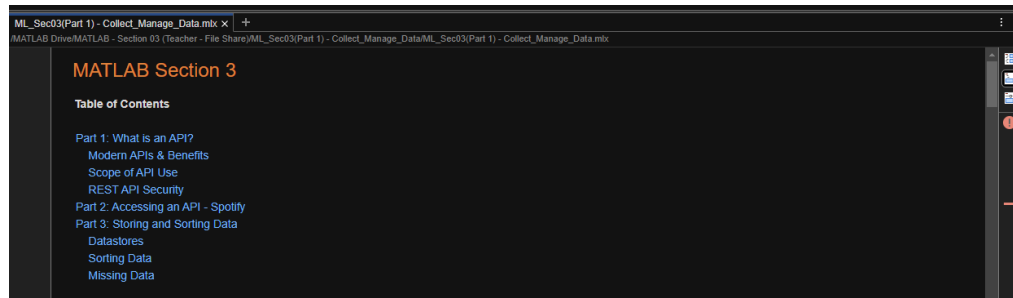
For the first coding activity, please open "**ML_Sec03(Part 1) – Collect_Manage_Data_v2.mlx**"

Please follow the examples along with the instructor or the PowerPoint PDF that can be found in the same folder as this section's code in the MATLAB Drive. After completing this live script, please continue to Part 2.
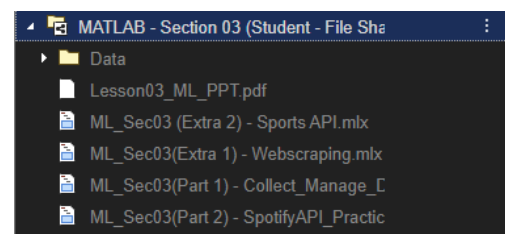
Practicing with the Spotify API

The live script for this section can be found in the same MATLAB Drive folder as above: [click here]
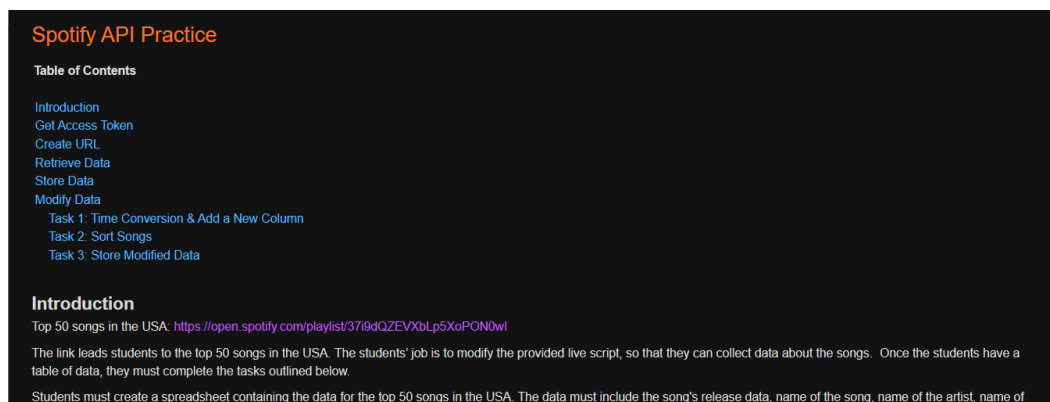
For this section you can use the hints given and the PPT to complete the given problems on your own. If you need help, the teacher or teaching assistant will be able to walk through the problem with you.

Make sure to refer back to the previous live script if you are stuck on what code to use to solve a problem!

Benefits of APIs

"Diverse Group Discussion" by SVG published by OpenClipart is licensed under Public Domain

Let's think about the lesson and activity we just did:

In this lesson, we learned about APIs and practiced retrieving data from the Spotify API. We also learned how to create datastores and sort data in MATLAB®.

Knowing this, discuss the following in groups:

1. Discuss the benefits of using an API to retrieve data versus directly uploading files with data into MATLAB®.
2. Reflect on any challenges faced when working with Spotify API in the practice activity.