ISA 401: Business Intelligence & Data Visualization

07: Connecting to APIs in R

Fadel M. Megahed, PhD

Endres Associate Professor
Farmer School of Business
Miami University

@FadelMegahed
fmegahed
fmegahed@miamioh.edu
Automated Scheduler for Office Hours

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Quick Refresher from Last Week [1]

- ✅ Understand when can we scrape data (i.e., `robots.txt`)
- ✅ Scrape a webpage Using R
- ✅ Utilize loops to scrape data from multiple webpages

Quick Refresher from Last Week [2]

A Note on HTML Element vs Elements for Tables

In office hours, I was asked a question related to the impact of using `[[]]` on the output from `html_table()` when `step2` utilizes `html_element()` vs `html_elements()`. So let us examine the Miami Football Wikipedia Page to: (a) answer this question; and (b) see the impact of `html_element()` vs `html_elements()` when there are multiple tables of the same class.

Learning Objectives for Today's Class

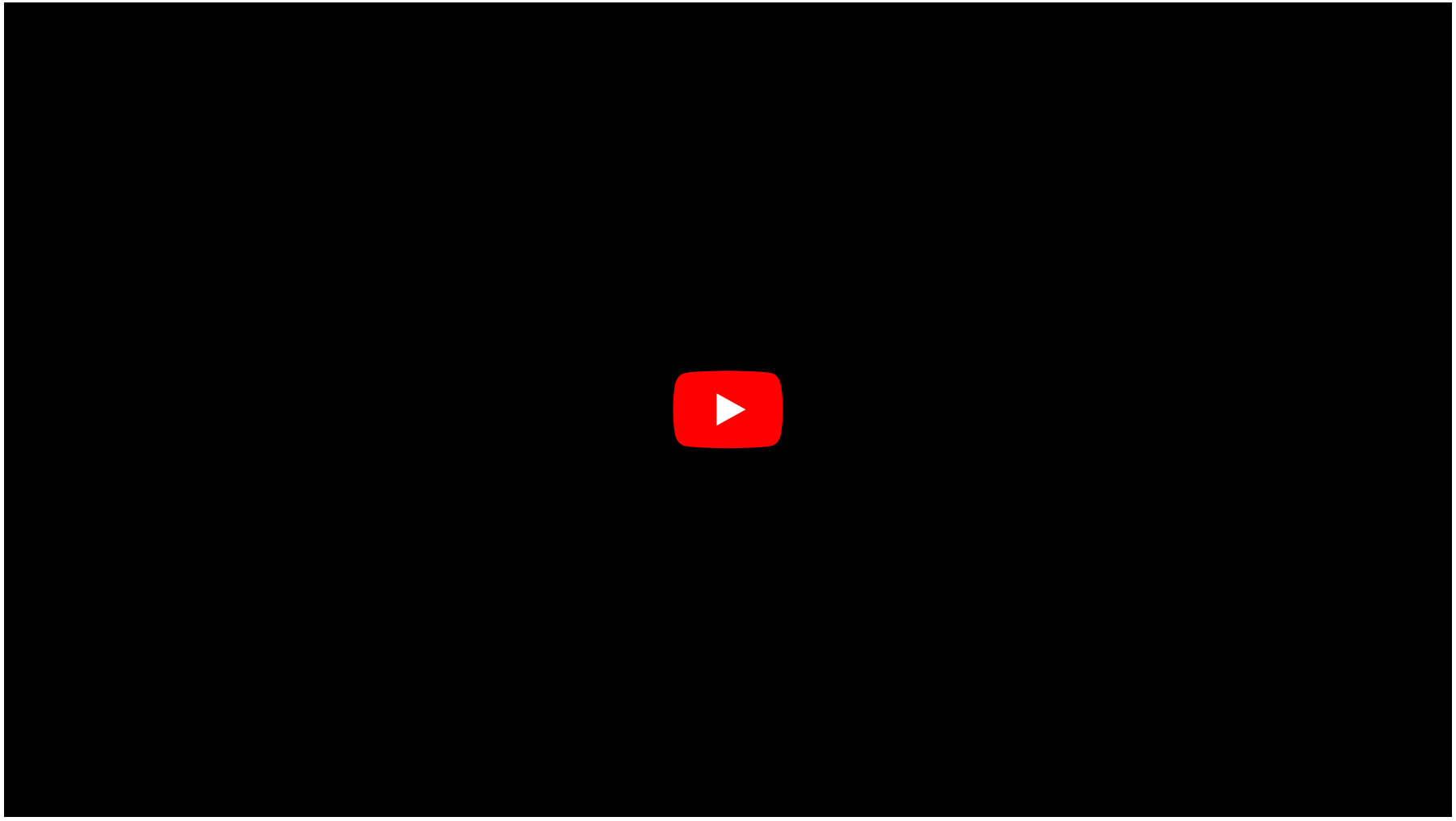
- Describe what we mean by an API
- Explain how APIs will be a huge part of your career as a business analyst and/or data scientist
- Use APIs for extracting web data

What is an API?
(A Web Server Based Perspective)

What is an API? [1]

- An **API** is an acronym for application programming interface.
- It is a **popular** approach to interact with an application/service or data since it:
  - Defines a set of functionalities independent of implementation (i.e., it only exposes information that a programmer might find useful and keep those parts consistent even if the implementation changes later)
  - Provides some level of privacy/control over one's internal data and the rate at which it can be accessed.

What is an API? [2]



What is an API? [3]

Scenario: Alone, you went into a warehouse and are trying to retrieve 3 screwdrivers, a toolbox, and 15 Phillips screws. But you do not know, where those things are in the warehouse.

The API is the set of instructions provided by the warehouse manager on where/how to retrieve this information without touching/accessing other things in there.

Source: Matt Z. (2018). What is an API? (explanation with cartoon picture so a 5 year old could understand it)

API Useages for Business Analysts and Data Scientists

Application #1: Request Data from Web Server

This is the **classical** example, which was explained in the previous slides and we will be coding several in-class demos to illustrate how to perform such operations in R.

Application #2: Access Python Libraries

Application #3: Use a Pretrained ML Model

Please click on the "Watch on Vimeo" to see OpenAI's explanation of their DALL·E 2 model.

Accessing APIs in 

The 3 Step Process

Before you dive into the API documentation, you **should first check if there is a R (or Python if you are familiar)** package/library that serves as a wrapper for that API.

- **Find** the **API's documentation** and find information about the following:
  A. Does the API require an **authentication key**?
  B. What are the API's **base URL** and **query parameters**?
  C. How does the request URL look like?
- Craft your **request**. My recommendations are to:
  A. First, start with a simple request.
  B. Test that request in your browser and see what results you get.
- Construct that request in  by **either**:
  A. If the generated content seems to be a `JSON` file/webpage, you can capitalize on the reading the content from `jsonlite::fromJSON()`; **OR**
  B. By passing the `base url` inside the `httr::GET()` and parsing the results with `httr::content()`.

Demo 1: Accuweather API

Demo Description | Code and Results

- Go to https://developer.accuweather.com/ and create an account.
- Add your first app (from the `MY APPS` tab) and copy the generated API key.
- Then using the API Reference Tab → Locations API → City Search → find the location key for `Oxford, Ohio`
- Use this information in the `Forecast API` to obtain the `5 Day Forecasts` for `Oxford Ohio`.

Demo 1: Accuweather API

Demo Description | Code and Results

```
## List of 2
##  $ Headline      :List of 9
##   ..$ EffectiveDate     : chr "2024-02-21T19:00:00-05:00"
##   ..$ EffectiveEpochDate: int 1708560000
##   ..$ Severity          : int 3
##   ..$ Text              : chr "Expect showery weather tomorrow evening through Thursday e
##   ..$ Category          : chr "rain"
##   ..$ EndDate           : chr "2024-02-23T01:00:00-05:00"
##   ..$ EndEpochDate      : int 1708668000
##   ..$ MobileLink        : chr "http://www.accuweather.com/en/us/oxford-oh/45056/daily-wea
##   ..$ Link              : chr "http://www.accuweather.com/en/us/oxford-oh/45056/daily-wea
##  $ DailyForecasts:'data.frame':    5 obs. of  8 variables:
##   ..$ Date       : chr [1:5] "2024-02-20T07:00:00-05:00" "2024-02-21T07:00:00-05:00" "202
##   ..$ EpochDate  : int [1:5] 1708430400 1708516800 1708603200 1708689600 1708776000
##   ..$ Temperature:'data.frame':    5 obs. of  2 variables:
##   .. ..$ Minimum:'data.frame':    5 obs. of  3 variables:
##   .. ..$ Maximum:'data.frame':    5 obs. of  3 variables:
##   ..$ Day        :'data.frame':    5 obs. of  5 variables:
##   .. ..$ Icon                  : int [1:5] 2 4 18 4 4
##   .. ..$ IconPhrase            : chr [1:5] "Mostly sunny" "Intermittent clouds" "Rain" "I
```

Demo 2: The CryptoCompare API

Demo Description | Code and Results

- Create a Personal (Free) account at CryptoCompare.com
- Click on create your free key to create your API key and copy the key.
- Go to the documentation, and test their sample call by executing the call after you have pasted your API key in the call.
    - The executed call returns the price of BTC (Bitcoin) in USD, JPY and EUR.
- Now click on the Historical Data Tab on the left
    - Click on Daily Pair OHLCV and Execute the Sample Call for BTC
    - This returns 10 days worth of OHLCV for BTC in USD.
- Let us obtain the price for $SHIB over the past 100 days.

Demo 2: The CryptoCompare API

Demo Description | Code and Results

```
##           time     high      low     open    close
## 96  2024-02-15 52845.45 51357.81 51844.19 51934.57
## 97  2024-02-16 52598.05 51604.88 51934.57 52163.28
## 98  2024-02-17 52201.89 50647.34 52163.28 51668.78
## 99  2024-02-18 52393.59 51194.30 51668.78 52139.33
## 100 2024-02-19 52487.60 51691.25 52139.33 51781.22
## 101 2024-02-20 52985.95 51318.92 51781.22 51634.04
```

Recap

Summary of Main Points

By now, you should be able to do the following:

- Describe what we mean by an API
- Explain how APIs will be a huge part of your career as a business analyst and/or data scientist
- Use APIs for extracting web data

Things to Do to Prepare for Next Class

- Getting Started with httr
- Managing secrets