

Assignment 03 - APIs and Text Mining

Due Date

March 3 (part 0) and March 15 (parts 1 and 2), 2023 by 11:59pm.

The learning objectives are to collect data from an API and perform text mining.

Midterm/Final Project (Part 0)

Please send me a description of the data that you are planning to use for your self-directed project. I just want to make sure that it is suitable!

APIs (Part 1)

The aim is to get more practice working with APIs. We will use an API maintained by NASA for retrieving information about near earth objects (NEOs), asteroids that pass close to Earth. The documentation is available at <https://api.nasa.gov/> (scroll down to the API titled Asteroids NeoWs). First you will need an API key for accessing the service. You can get one at <https://api.nasa.gov/> where you will need to supply an email address, which can be either your UofT email or a personal email address.

1. Use `start_date` and `end_date` along with the API key to submit an HTTP GET request to the NASA NeoWs Feed API. Pick a range of a few days.
2. There should be 3 elements in your retrieved query: a list of urls, the number of near earth objects that had their nearest approach during the time spanned by `start_date` and `end_date`, and an object whose attributes are the dates (represented by strings of the form YYYY-MM-DD) in the time spanned by `start_date` and `end_date`. Each such date attribute has an array of values, each of which represents a near Earth object. Summarize how many near earth objects you retrieved and some of the parameters that are available for them.
3. Extract information on `estimated_diameter`, `is_potentially_hazardous_asteroid`, and `relative_velocity`, and create a table with this information for all of the NEOs pulled in your date range.
4. Explore how the number of near Earth objects per day changes from day to day. Is this number correlated from one day to the next?
5. Explore associations between the three variables extracted in 3.

Text Mining (Part 2)

The Consumer Financial Protection Bureau maintains a database of customer complaints. We will use text mining to see if there are any trends in the reported consumer's narrative description of the issue/complaint. The data can be acquired here: <https://www.consumerfinance.gov/data-research/consumer-complaints/>.

1. Using `data.table` (the file is very large), subset the data to include only the last 3 years (use `Date received`). Summarize dataset dimensions and variables. Bonus points (10) use the API to acquire the data!
2. Tokenize the complaints (variable `Issue`) and count the number of each token. Do you see anything interesting? Does removing stop words change what tokens appear as the most frequent? What are the 5 most common tokens for each search term after removing stopwords?

3. Tokenize the abstracts into bigrams. Find the 10 most common bigram and visualize them with ggplot2.
4. Calculate the TF-IDF value for each word-search term combination. (here you want the search term to be the “document”) What are the 5 tokens from each search term with the highest TF-IDF value? How are the results different from the answers you got in question 1?