Data Collecting
– Web scraping from public websites

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Data Collecting

- Web scraping from public websites
  - How to collect data from websites
  - 10K reports from SEC.gov
  - EU Open Data
  - Open data Swiss
- Collecting data using API
  - Tweeter
  - Facebook
- Database in IMD library
  - Bloomberg
  - Thomson One
  - Datastream
  - Factiva: news media
- IoT (Internet of Things)
  - Smart building
  - Wearable devices
  - Web traffic

Data collecting approaches

- Level 1. Manual collection
- Level 2. Using a code to download multiple files
- Level 3. Using API (Application Programming Interface)
- Level 4. Using a code for Web scraping

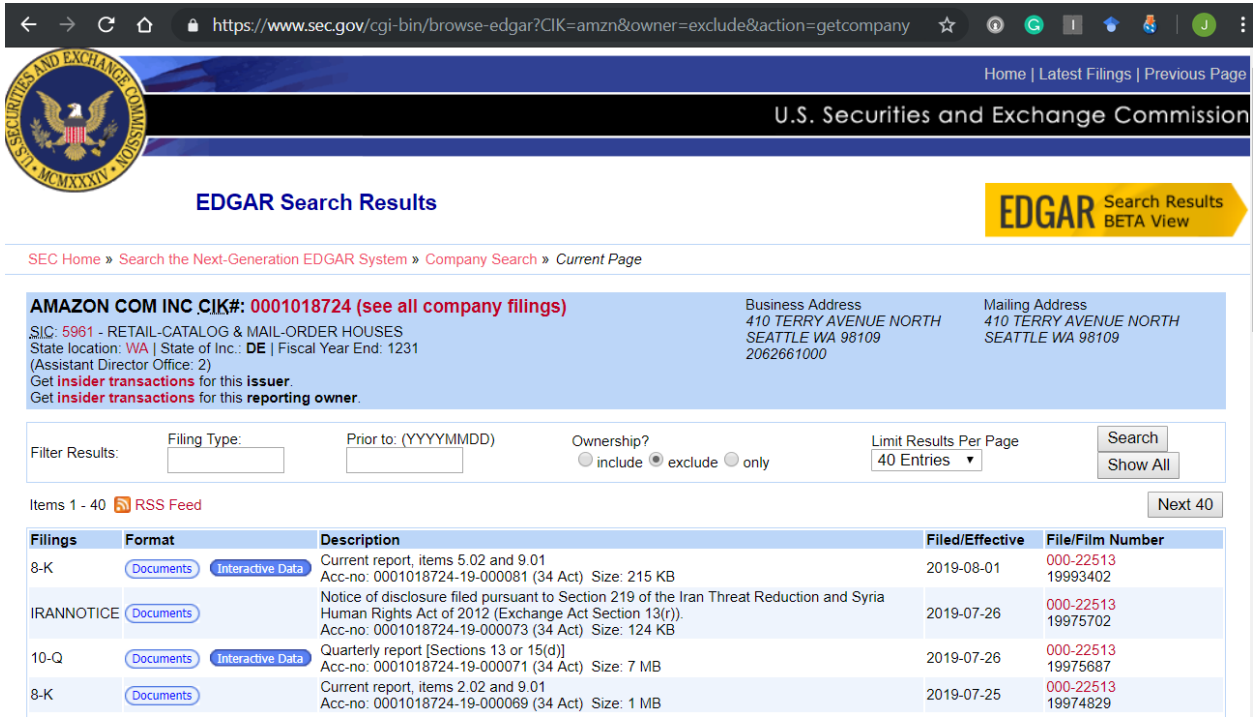
Public data sources (examples)

- Data from public websites
  - SEC.gov
  - EU Open Data
  - Open data Swiss
  - London Data Store
  - Wikipedia

- Data from commercial websites
  - Tweeter
  - Amazon

Level 1: manual collection
ex. Company filings from SEC.gov

- https://www.sec.gov/edgar/searchedgar/companysearch.html
- Mouse right-click and download individual files



Level 2: Using a code to download multiple files ex. Company filings from SEC.gov

```
import requests
def download (url):
    path = url.split("/")[-1]
    r = requests.get(url)
    open(path, 'wb').write(r.content)

urls =
['https://www.sec.gov/Archives/edgar/data/320193/0000
320193-19-000026.txt',
'https://www.sec.gov/Archives/edgar/data/320193/00011
93125-19-004664.txt']

for url in urls:
    download (url)
```

- Define a function for downloading
- Use the same file name obtained from url
- Get the file indicated by the url
- Write the content of the file indicated by the url as the name defined in path
- Set url addresses (ex. from SEC.gov)
- Call the download function repeatedly

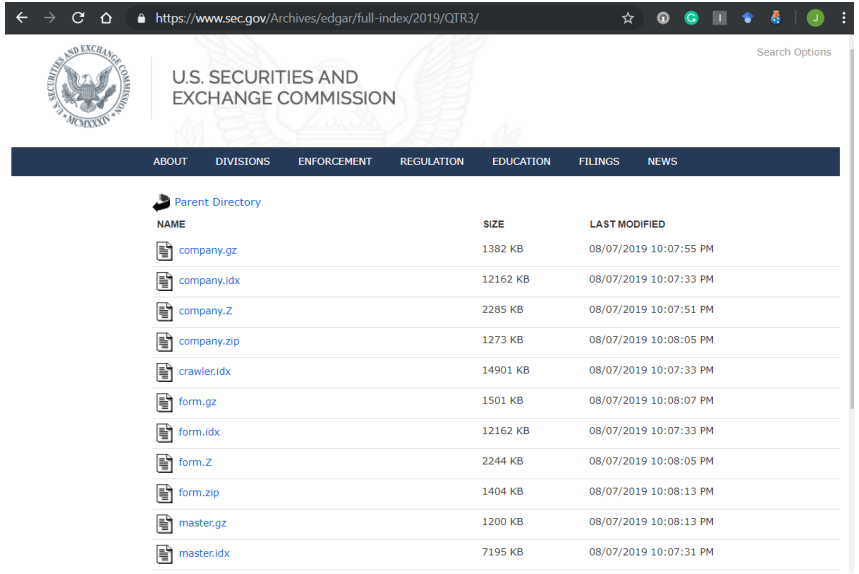
Level 2: Using a code to download multiple files
ex. Company filings from SEC.gov

SEC.gov explains how to access files from their server:
https://www.sec.gov/edgar/searchedgar/accessing-edgar-data.htm

For example, we can use the file locations written in the master index provided by SEC.gov:
https://www.sec.gov/Archives/edgar/full-index/2019/QTR1/master.idx

```
master.idx

Description:           Master Index of EDGAR Dissemination FeedLast Data Received:    March 31,
2019Comments:              webmaster@sec.govAnonymous FTP:        ftp://ftp.sec.gov/edgar/Cloud HTTP:
https://www.sec.gov/Archives/   CIK|Company Name|Form Type|Date Filed|Filename----------------------------------
--------------------------------------------
1000045|NICHOLAS FINANCIAL INC|10-Q|2019-02-14|edgar/data/1000045/0001193125-19-039489.txt
1000045|NICHOLAS FINANCIAL INC|4|2019-01-15|edgar/data/1000045/0001357521-19-000001.txt
1000045|NICHOLAS FINANCIAL INC|4|2019-02-19|edgar/data/1000045/0001357521-19-000002.txt
1000045|NICHOLAS FINANCIAL INC|4|2019-03-15|edgar/data/1000045/0001357521-19-000003.txt
1000045|NICHOLAS FINANCIAL INC|8-K|2019-02-01|edgar/data/1000045/0001193125-19-024617.txt
1000045|NICHOLAS FINANCIAL INC|SC 13G/A|2019-02-04|edgar/data/1000045/0001104659-19-005360.txt
1000045|NICHOLAS FINANCIAL INC|SC 13G/A|2019-02-08|edgar/data/1000045/0001258897-19-001312.txt
1000045|NICHOLAS FINANCIAL INC|SC 13G/A|2019-02-11|edgar/data/1000045/0001019056-19-000082.txt
```



Level 3. Using API (Application Programming Interface)

```
# Construct a vector of 2 URLs
urls <- c("http://httpbin.org/status/404", "http://httpbin.org/status/301")
for(url in urls){
	# Send a GET request to url
	result <- GET(url, user_agent("my@email.address this is a test"))

	# Check request_result
	if(http_error(result)){
		warning('The request failed')
	} else {
		content(result)
	}

	# Delay for 5 seconds between requests
	Sys.sleep(5)
	}

	# Create list with nationality and country elements
	query_params <- list(nationality = "americans",	country =
	"antigua")
	 # Make parameter-based call to httpbin, with
	query_paramsparameter_response <-
	GET("https://httpbin.org/get", query = query_params)
	# Print parameter_responseparameter_response

	# Construct a directory-based API URL to `http://swapi.co/api`,
	# looking for person `1` in `people`directory_url <-
	paste("http://swapi.co/api", "people", "1", sep = '/')# Make a GET
	call with itresult <- GET(directory_url)
```

Level 3. Using API (Application Programming Interface)
ex. R code for collecting table information from Wikipedia

```
library(httr)
library(rvest)
library(xml2)

get_infobox <- function(title){
  base_url <- "https://en.wikipedia.org/w/api.php"

  # Change "Hadley Wickham" to title
  query_params <- list(action = "parse",
                       page = title,
                       format = "xml")

  resp <- GET(url = base_url, query = query_params)
  resp_xml <- content(resp)

  page_html <- read_html(xml_text(resp_xml))
  infobox_element <- html_node(x = page_html, css =".infobox")
  page_name <- html_node(x = infobox_element, css = ".fn")
  page_title <- html_text(page_name)

  wiki_table <- html_table(infobox_element)
  colnames(wiki_table) <- c("key", "value")
  cleaned_table <- subset(wiki_table, !wiki_table$key == "")
  name_df <- data.frame(key = "Full name", value = page_title)
  wiki_table <- rbind(name_df, cleaned_table)

  wiki_table
}

# Test get_infobox with "Hadley Wickham"
get_infobox(title = "Hadley Wickham")
```

Level 4. Using a code for Web scraping

It is possible to extract texts from any websites using R and Python.

[to be updated]

References

10K and proxy statements from SEC.gov and context analysis
- Abraham Lu at IMD Global Board Center (abraham.lu@imd.org)

Webscribing codes
https://www.datacamp.com/courses/working-with-web-data-in-r