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

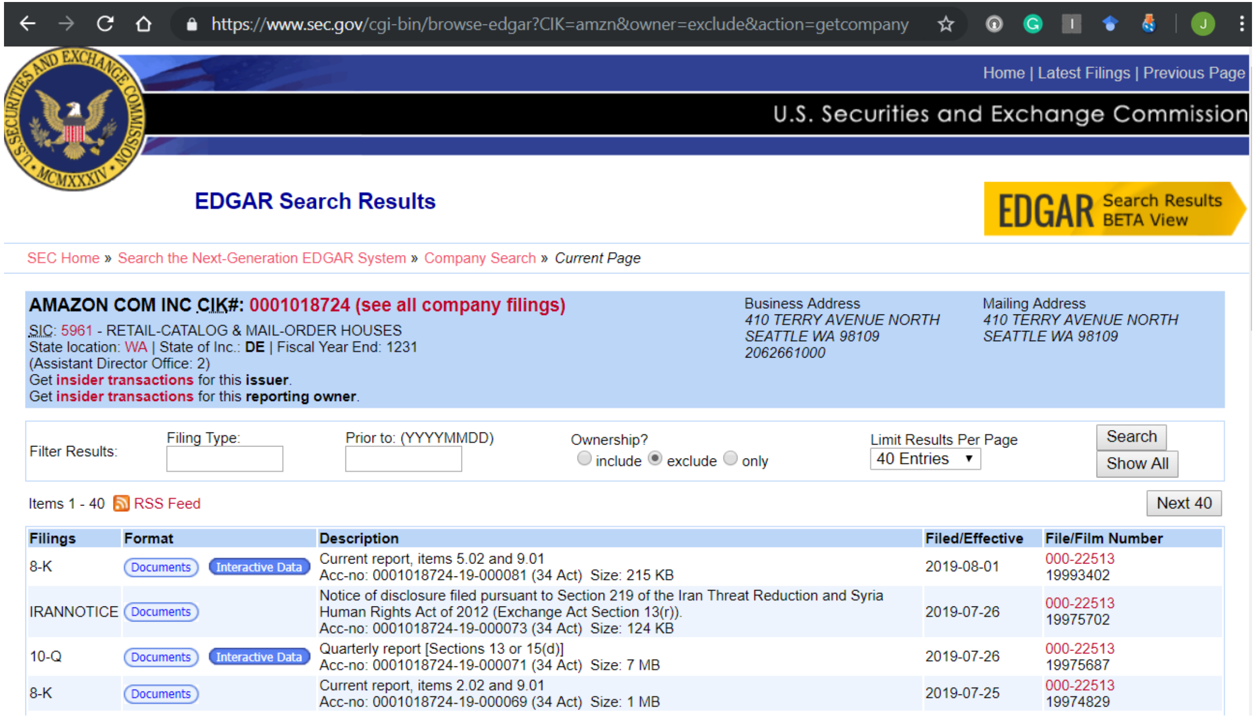
- Database in IMD library
  - Bloomberg
  - Thomson One
  - Datastream
  - Factiva: news media
- IoT (Internet of Things)
  - Smart building
  - Wearable devices
  - Web traffic

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

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



https://www.sec.gov/cgi-bin/browse-edgar?CIK=amzn&owner=exclude&action=getcompany

Home | Latest Filings | Previous Page
U.S. Securities and Exchange Commission
EDGAR Search Results BETA View

EDGAR Search Results

SEC Home » Search the Next-Generation EDGAR System » Company Search » *Current Page*

AMAZON COM INC CIK#: 0001018724 (see all company filings)

SIC: 5961 - RETAIL-CATALOG & MAIL-ORDER HOUSES
State location: WA | State of Inc.: **DE** | Fiscal Year End: 1231
(Assistant Director Office: 2)
Get **insider transactions** for this **issuer**.
Get **insider transactions** for this **reporting owner**.

Business Address
410 TERRY AVENUE NORTH
SEATTLE WA 98109
2062661000

Mailing Address
410 TERRY AVENUE NORTH
SEATTLE WA 98109

Filter Results: Filing Type: Prior to: (YYYYMMDD) Ownership? ○ include ● exclude ○ only Limit Results Per Page 40 Entries

Items 1 - 40 RSS Feed

Filings	Format	Description	Filed/Effective	File/Film Number
8-K	Documents Interactive Data	Current report, items 5.02 and 9.01 Acc-no: 0001018724-19-000081 (34 Act) Size: 215 KB	2019-08-01	000-22513 19993402
IRANNOTICE	Documents	Notice of disclosure filed pursuant to Section 219 of the Iran Threat Reduction and Syria Human Rights Act of 2012 (Exchange Act Section 13(r)). Acc-no: 0001018724-19-000073 (34 Act) Size: 124 KB	2019-07-26	000-22513 19975702
10-Q	Documents Interactive Data	Quarterly report [Sections 13 or 15(d)] Acc-no: 0001018724-19-000071 (34 Act) Size: 7 MB	2019-07-26	000-22513 19975687
8-K	Documents	Current report, items 2.02 and 9.01 Acc-no: 0001018724-19-000069 (34 Act) Size: 1 MB	2019-07-25	000-22513 19974829

- Easy to do; can check what we get immediately
- Boring and time-consuming
- We used to hire interns to do so

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

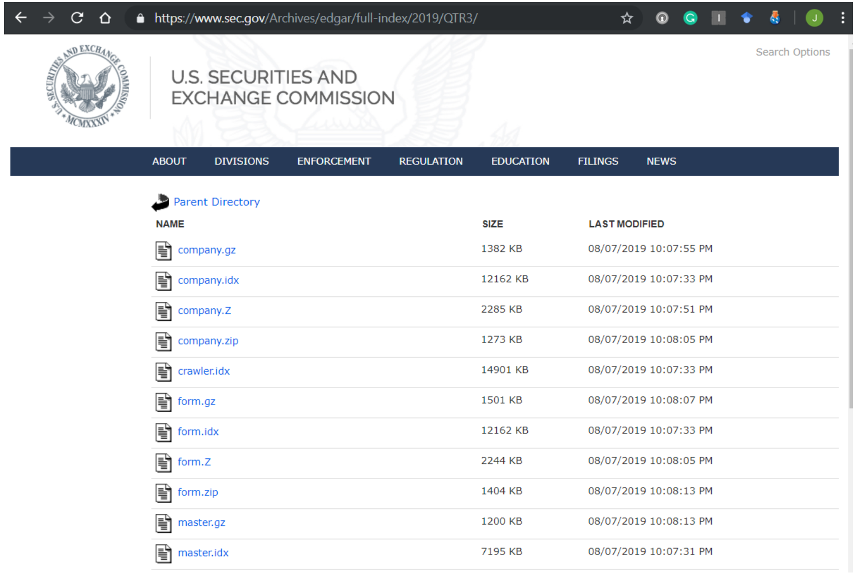
Level 2: Using a code to download multiple files
ex. Company filings from SEC.gov

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
```



NAME	SIZE	LAST MODIFIED
company.gz	1382 KB	08/07/2019 10:07:55 PM
company.idx	12162 KB	08/07/2019 10:07:33 PM
company.Z	2285 KB	08/07/2019 10:07:51 PM
company.zip	1273 KB	08/07/2019 10:08:05 PM
crawler.idx	14901 KB	08/07/2019 10:07:33 PM
form.gz	1501 KB	08/07/2019 10:08:07 PM
form.idx	12162 KB	08/07/2019 10:07:33 PM
form.Z	2244 KB	08/07/2019 10:08:05 PM
form.zip	1404 KB	08/07/2019 10:08:13 PM
master.gz	1200 KB	08/07/2019 10:08:13 PM
master.idx	7195 KB	08/07/2019 10:07:31 PM

Level 3. Using API (Application Programming Interface)

- API is a standardized way for external users to collect data from a website's database
- Some websites like wikipedia provide API to encourages developing a third-party software providing additional services based on the company's product
- Also, this can avoid the abuse of data access using a risky method to the server

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"

  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
}

get_infobox(title = "International Institute for Management Development")
```

Call some packages

Define a function get_infobox

We will use wikipedia api

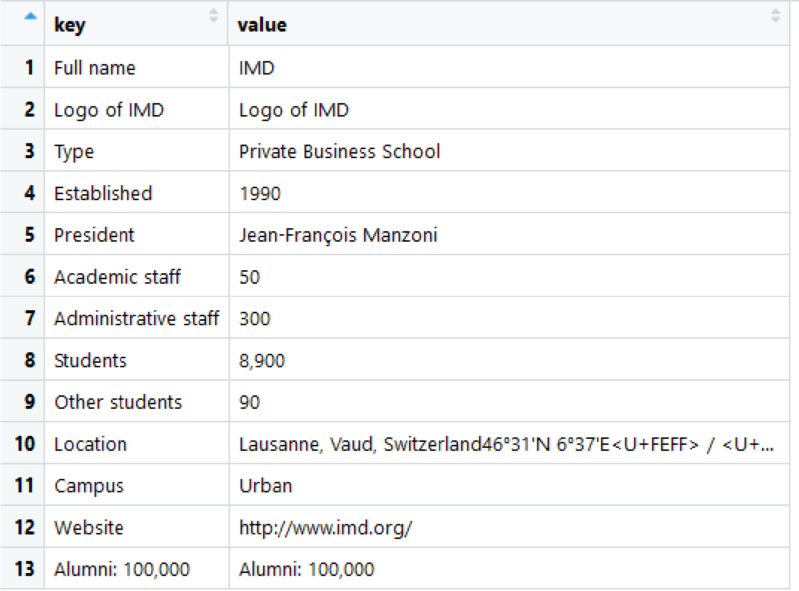
Send query parameters and receive data

Rearrange the data into a table form

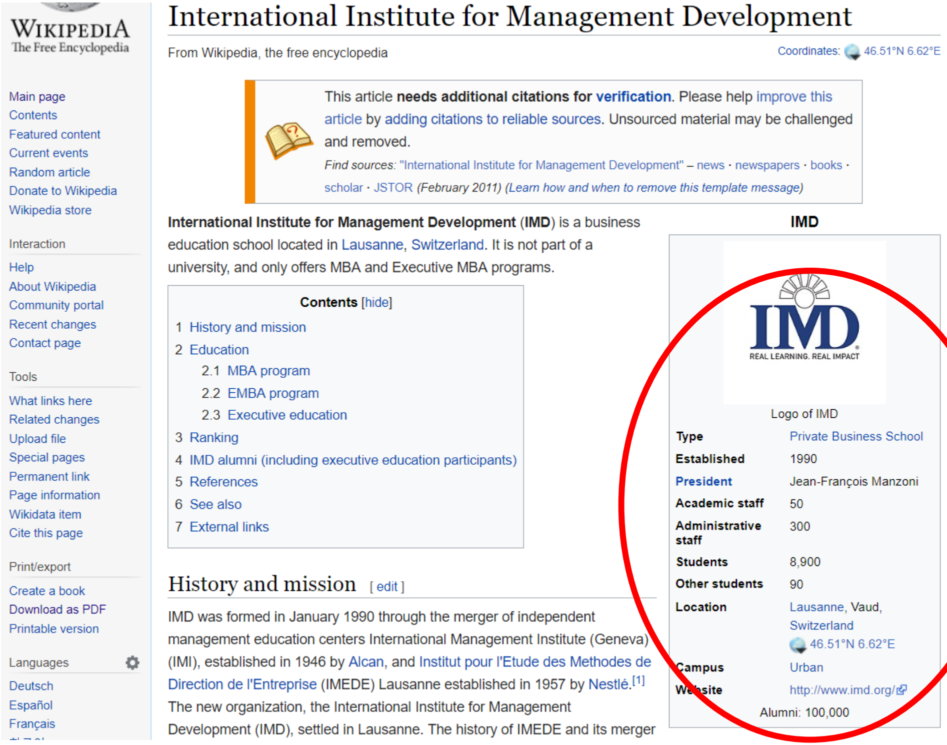
Call the function for “IMD”

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

Output



	key	value
1	Full name	IMD
2	Logo of IMD	Logo of IMD
3	Type	Private Business School
4	Established	1990
5	President	Jean-François Manzoni
6	Academic staff	50
7	Administrative staff	300
8	Students	8,900
9	Other students	90
10	Location	Lausanne, Vaud, Switzerland46°31'N 6°37'E<U+FEFF> / <U+...
11	Campus	Urban
12	Website	http://www.imd.org/
13	Alumni: 100,000	Alumni: 100,000



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The Free Encyclopedia

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Languages
Deutsch
Español
Français

International Institute for Management Development

From Wikipedia, the free encyclopedia

Coordinates: 46.51°N 6.62°E

This article **needs additional citations for verification**. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.
Find sources: "International Institute for Management Development" – news · newspapers · books · scholar · JSTOR *(February 2011) (Learn how and when to remove this template message)*

International Institute for Management Development (**IMD**) is a business education school located in Lausanne, Switzerland. It is not part of a university, and only offers MBA and Executive MBA programs.

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2.2 EMBA program
2.3 Executive education
3 Ranking
4 IMD alumni (including executive education participants)
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History and mission [edit]

IMD was formed in January 1990 through the merger of independent management education centers International Management Institute (Geneva) (IMI), established in 1946 by Alcan, and Institut pour l'Etude des Methodes de Direction de l'Entreprise (IMEDE) Lausanne established in 1957 by Nestlé.[1] The new organization, the International Institute for Management Development (IMD), settled in Lausanne. The history of IMEDE and its merger

IMD

Logo of IMD

Type	Private Business School
Established	1990
President	Jean-François Manzoni
Academic staff	50
Administrative staff	300
Students	8,900
Other students	90
Location	Lausanne, Vaud, Switzerland 46.51°N 6.62°E
Campus	Urban
Website	http://www.imd.org/

Alumni: 100,000

Level 4. Using a code for Web scraping

Even though there is no API provided, it is possible to extract texts from any websites using R and Python.

[to be updated]

References and IMD Champions

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

Public data sources (examples, to be updated)

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

- Data from commercial websites
  - Tweeter
  - Amazon