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ACCESSING AND ANALYSING WEB AND SOCIAL MEDIA DATA

FINDING AND WORKING WITH DATASETS

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WHAT ARE DATASETS AND DATADUMPS?

- Any collection of data → a **dataset!** Examples:
    - one text file with your 5 favorite prime numbers…
    - A csv-file with all the phone numbers and names of every person and organization in Spain
    - 10 Terrabyte of Youtube videos with their subtitles, collected into 3000 files
    - … anything
- Often: The data is **structured**
- Sometimes: The data is **labeled** (Humans put a label on every Datum)
    - Important for machine learning, AI

WHAT ARE DATASETS AND DATADUMPS?

- A **data dump** is a special kind of dataset:
  - a whole database (or a significant part of it) of a specific website.
  - E.g.: all of OpenStreetMap; all of Wikidata; all of the english Wikipedia; all of the website Stack Overflow. There is even a collection of all reddit posts and all reddit comments available.
- Why?!
  - Service to researchers, „Open Data“
  - Prevent people from having to scrape a whole site

WHAT ARE DATASETS AND DATADUMPS?

“As of 20 February 2022, there are 6,456,456 articles in the English Wikipedia”, scraping them all with Rvest would take 75 days, if you access 1 page per second (which might get you blocked) (1 page/s * 60*60*24*365 = 31.5 Million Pages per year).

Instead of scraping the whole site, you can download a compressed data dump of the English Wikipedia which is 20.47 GB in size and downloads in a few minutes.

Working with large datasets can sometimes be a challenge. The format of the data is often different and special. Sometimes you don’t have access to a computer with large enough RAM to fit the whole dataset into memory. We will do some exercises that will help you find out how to work with large datasets.

HOW TO WORK WITH BIG DATA?

Rule 1: Have a big computer to work with big data! Lot’s of RAM will be helpful.

Other rules:

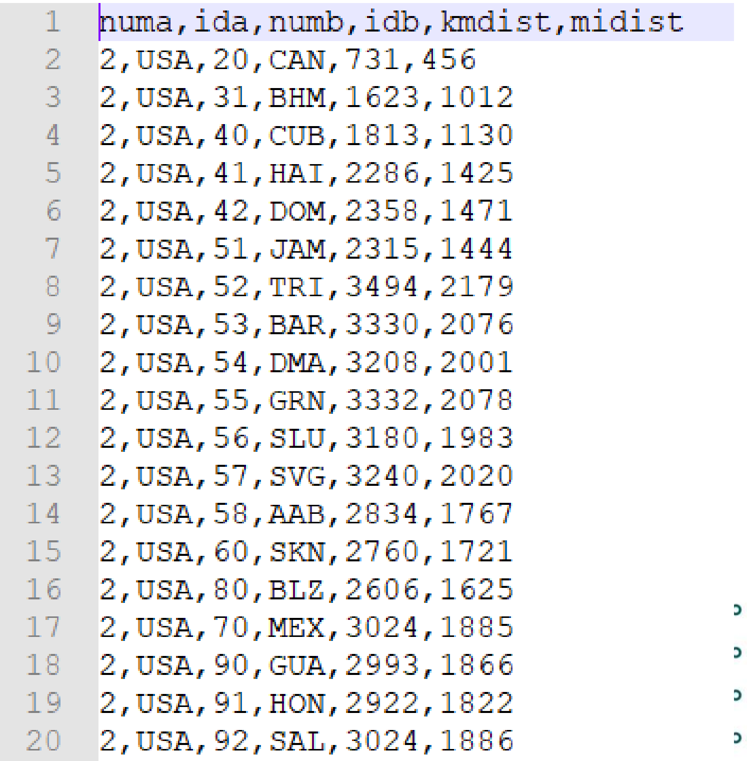
- Extract only a part of the data, filter and save what you need. Close that part
- Go on with the next part, until you went through the whole data.
- While the computer works: do something else. Wait for a few days.
- → Now you have much smaller data!

DATA FORMATS

DATA FORMATS - CSV

Comma Seperated Value

→ A table, stored in a text file
→ one row of the table → one line in the text file
→ Values in the table are seperated by commas
(Show example)



```
numa,ida,numb,idb,kmdist,midist
2,USA,20,CAN,731,456
2,USA,31,BHM,1623,1012
2,USA,40,CUB,1813,1130
2,USA,41,HAI,2286,1425
2,USA,42,DOM,2358,1471
2,USA,51,JAM,2315,1444
2,USA,52,TRI,3494,2179
2,USA,53,BAR,3330,2076
2,USA,54,DMA,3208,2001
2,USA,55,GRN,3332,2078
2,USA,56,SLU,3180,1983
2,USA,57,SVG,3240,2020
2,USA,58,AAB,2834,1767
2,USA,60,SKN,2760,1721
2,USA,80,BLZ,2606,1625
2,USA,70,MEX,3024,1885
2,USA,90,GUA,2993,1866
2,USA,91,HON,2922,1822
2,USA,92,SAL,3024,1886
```

Advantages:
* easy to read with any tool (Text editor, R, Python, Excel)
* easy to write, share, store
* future proof

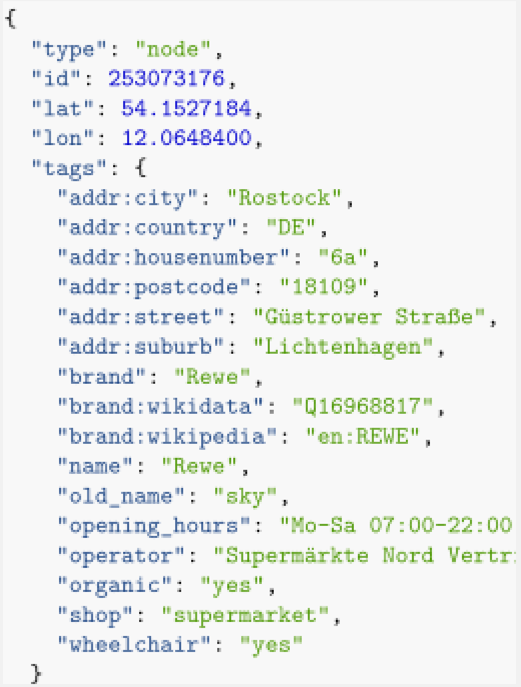
Disadvantages
* large, if left uncompressed
* looses type information. A date has to be converted to a string when writing, and back to a date when reading. This can lead to errors.
* Slower than some alternatives to read.

DATA FORMATS - JSON

(Show example)
Advantages:
* Widely used
* easy to read and write
* Hierarchical structure can be preserved

Disadvantages:
* verbose and large files
* slow to parse for very large files

https://www.json.org/example.html



```
{
  "type": "node",
  "id": 253073176,
  "lat": 54.1527184,
  "lon": 12.0648400,
  "tags": {
    "addr:city": "Rostock",
    "addr:country": "DE",
    "addr:housenumber": "6a",
    "addr:postcode": "18109",
    "addr:street": "Güstrower Straße",
    "addr:suburb": "Lichtenhagen",
    "brand": "Rewe",
    "brand:wikidata": "Q16968817",
    "brand:wikipedia": "en:REWE",
    "name": "Rewe",
    "old_name": "sky",
    "opening_hours": "Mo-Sa 07:00-22:00
    "operator": "Supermärkte Nord Vertr
    "organic": "yes",
    "shop": "supermarket",
    "wheelchair": "yes"
  }
```

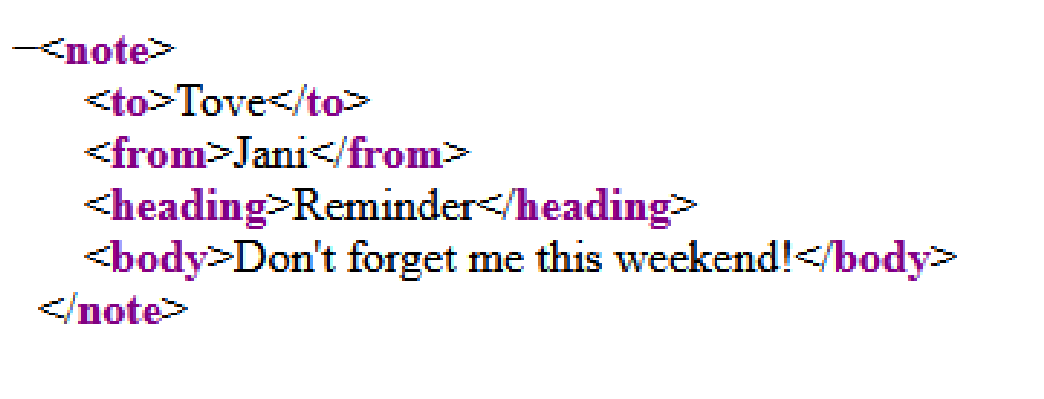
DATA FORMATS - XML

Like a cross between json and HTML (but mostly the bad parts)
Some old systems still use it… so maybe you have to use it as well!

Advantages:
* Well structured
* readable
* Libraries for every language available

Disadvantages:

- very verbose
- outdated



```
-<note>
    <to>Tove</to>
    <from>Jani</from>
    <heading>Reminder</heading>
    <body>Don't forget me this weekend!</body>
 </note>
```

DATA FORMATS - PARQUET

Advantages:
* Very fast to read!
* Type information is saved. A date will stay a date.
* More efficient storage

Disadvantage:
* You need a specialized library to write and read it (But it is a standard and can be shared between languages)
* Binary format – you can’t use a text editor to look inside it.

DATA FORMATS – PICKLE AND RDATA

Binary formats specific to a programming language

Advantages:
* easy to use, as long as your environment stays the same
* fast
* types stay the same

Disadvantages:
* No compatibility between languages
* → not good for sharing or long-time storage
* no metadata
* Binary format – you can’t use a text editor to look inside it.

EXCEL OR STATA

Bad!

Disadvantages:
* You need a proprietary tool to work properly with it
* slow to read and write
* not well structured
* people might laugh or shout at you

Advantages:
* nothing?
* There are libraries in R to read and write Excel files. They mostly work.
* Sometimes Excel might be „the right tool for the job“
* Good when working together with non-programmers

PDF

Great for sharing documents. Bad for sharing data. If you get data in pdf-format… good luck!

MANY OTHER FORMATS

There might always be a package in R to read it.

* Feather
* SQLite
* YAML
* TOML
* Image formats
* Video formats

HOW TO SHARE YOUR DATA

Depends on the use case.

Compressed csv is often a good choice.

THANK YOU FOR YOUR ATTENTION!

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THANK YOU!