Web Data – Scraping and APIs

Scraping the web

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Web scraping is the process of extracting this information automatically and transforming it into a structured dataset.

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Scraping the web: two approaches

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2. Web APIs (application programming interfaces): a set of structured http requests that return JSON or XML data
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   - Packages specific to each API: weatherData, WDI, Rfacebook... Check CRAN Task View on Web Technologies and Services for examples

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The art of web scraping

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3. Build prototype code: extract, prepare, validate
4. Generalize: functions, loops, debugging
5. Data cleaning

The art of web scraping

Three main scenarios

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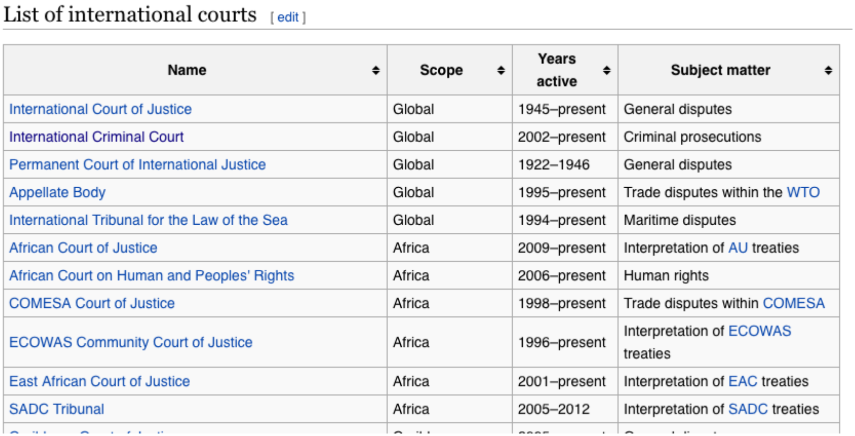
1. Data in table format

International court

From Wikipedia, the free encyclopedia

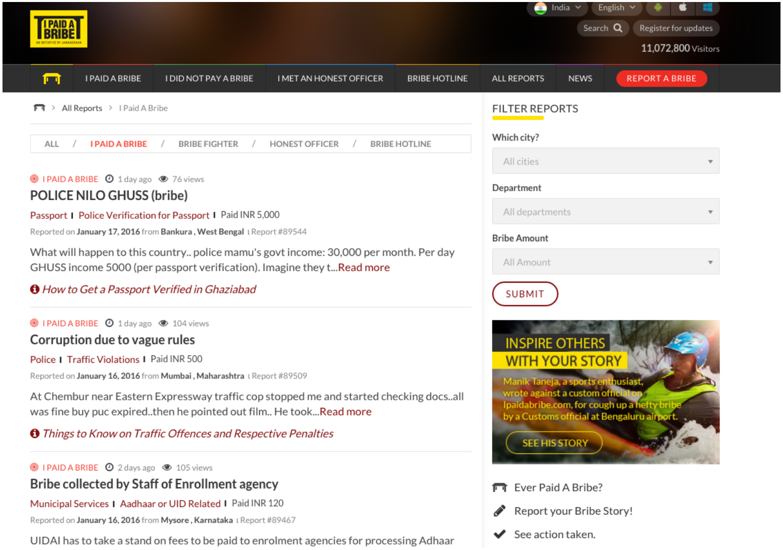


List of international courts [edit]

Name	Scope	Years active	Subject matter
International Court of Justice	Global	1945–present	General disputes
International Criminal Court	Global	2002–present	Criminal prosecutions
Permanent Court of International Justice	Global	1922–1946	General disputes
Appellate Body	Global	1995–present	Trade disputes within the WTO
International Tribunal for the Law of the Sea	Global	1994–present	Maritime disputes
African Court of Justice	Africa	2009–present	Interpretation of AU treaties
African Court on Human and Peoples' Rights	Africa	2006–present	Human rights
COMESA Court of Justice	Africa	1998–present	Trade disputes within COMESA
ECOWAS Community Court of Justice	Africa	1996–present	Interpretation of ECOWAS treaties
East African Court of Justice	Africa	2001–present	Interpretation of EAC treaties
SADC Tribunal	Africa	2005–2012	Interpretation of SADC treaties

Three main scenarios

2. Data in unstructured format



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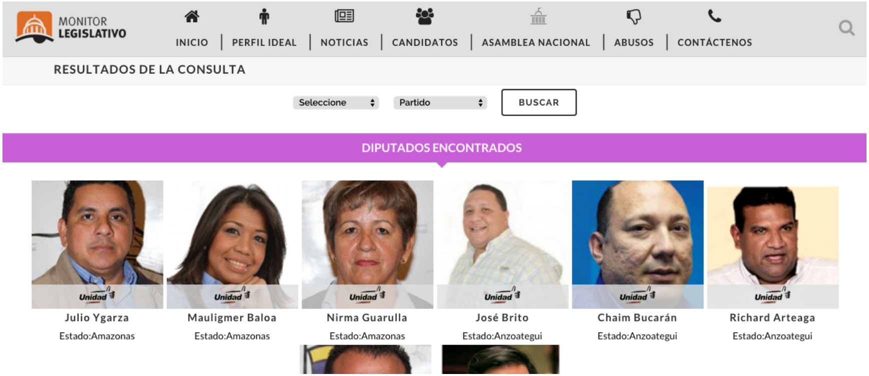
Three main scenarios

3. Data hidden behind web forms


MONITOR LEGISLATIVO
INICIO | PERFIL IDEAL | NOTICIAS | CANDIDATOS | ASAMBLEA NACIONAL | ABUSOS | CONTÁCTENOS
RESULTADOS DE LA CONSULTA
Seleccione
Partido
BUSCAR
DIPUTADOS ENCONTRADOS

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Estado:Amazonas	Estado:Amazonas	Estado:Amazonas	Estado:Anzoategui	Estado:Anzoategui	Estado:Anzoategui

Candidates on 2015 Venezuelan parliamentary election

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HTML: a primer

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- HTML is text with marked-up structure, defined by tags:

-
  ```
  <!DOCTYPE html>
  <html>
  <body>

  <h1>My First Heading</h1>

  <p>My first paragraph.</p>

  </body>
  </html>
  ```
- What you see in your browser is an interpretation of the HTML document

HTML: a primer

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  - Hyperlinks: `<a>`
- An example: www.pablobarbera.com

Beyond HTML

- Cascading Style Sheets (CSS): describes formatting of HTML components (e.g. `<h1>`, `<div>`...), useful for us!

- Javascript: adds functionalities to the website (e.g. change content/structure after website has been loaded)

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- How to identify relevant CSS selectors? `selectorGadget` extension for Chrome and Firefox.

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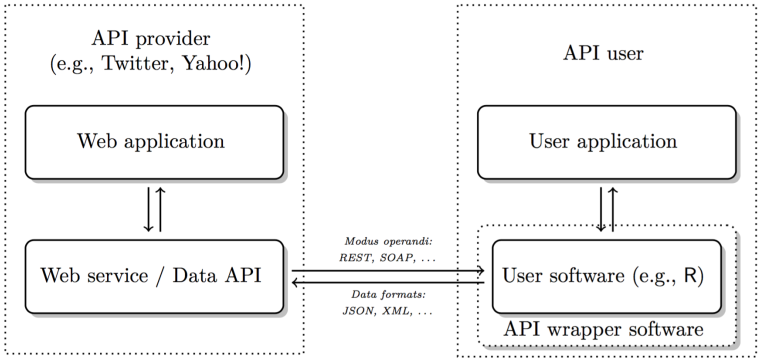
HTTP = Hypertext Transfer Protocol; how browsers and e-mail clients communicate with servers.



Source: Munzert et al, 2014, Figure 9.8

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Most APIs are rate-limited:

- Restrictions on number of API calls by user/IP address and period of time.
- Commercial APIs may impose a monthly fee

Connecting with an API

Constructing a REST API call:

- Baseline URL endpoint: `https://maps.googleapis.com/maps/api/geocode/json`
- Parameters: `?address=budapest`
- Authentication token (optional): `&key=XXXXX`

From R, use `httr` package to make `GET` request:

```
library(httr)
r <- GET(
"https://maps.googleapis.com/maps/api/geocode/json",
query=list(address="budapest"))
```

If request was successful, returned code will be 200, where `4xx` indicates client errors and `5xx` indicates server errors.
If you need to attach data, use `POST` request.

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- But many packages have their own specific functions to read data in JSON format; `content(r, "parsed")`

Authentication

- Many APIs require an access key or token
- An alternative, open standard is called OAuth
- Connections without sharing username or password, only temporary tokens that can be refreshed
- `httr` package in R implements most cases (examples)

R packages

Before starting a new project, worth checking if there's already an R package for that API. Where to look?

- CRAN Web Technologies Task View (but only packages released in CRAN)
- GitHub (including unreleased packages and most recent versions of packages)
- rOpenSci Consortium

Also see this great list of APIs in case you need inspiration.

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