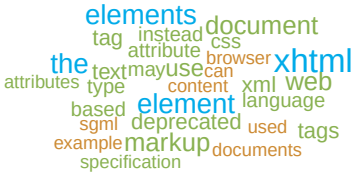
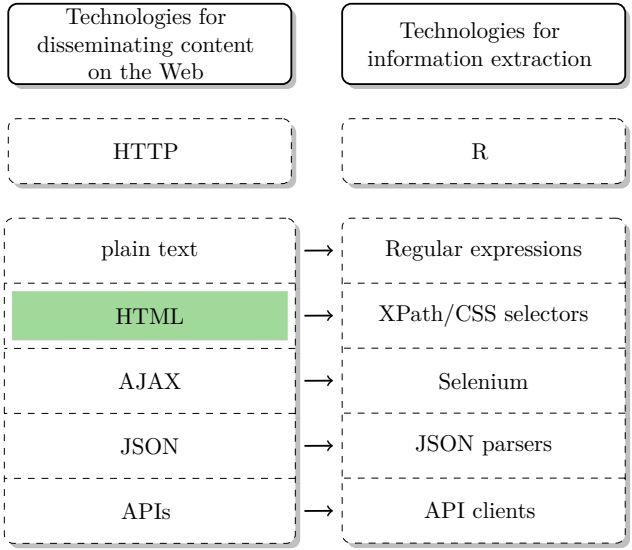
Introduction to Web Scraping with R

HTML



Simon Munzert | IPSDS

Technologies of the World Wide Web



HTML basics

HTML – a quick primer

What's HTML?

- **H**yper**T**ext **M**arkup **L**anguage
- markup language = plain text + markups
- W3C standard for the construction of websites
- lies underneath of what you see in your browser

HTML – a quick primer

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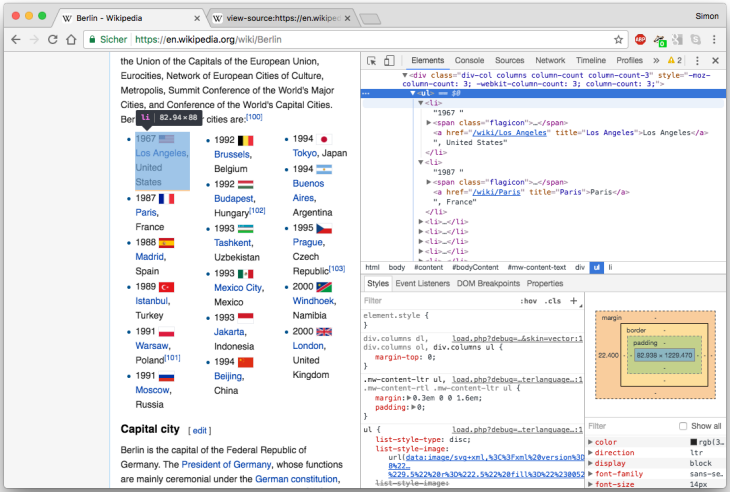
Why is this important to us?

- it determines where and how information is stored
- a basic understanding of HTML helps us locate the information we want to retrieve
- relax. A passive understanding of HTML is sufficient

HTML in the wild

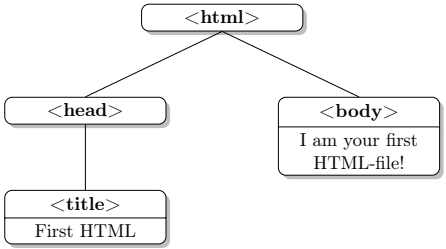
HTML in the wild

HTML in the wild



Tree structure

```
1  <!DOCTYPE html>
2    <html>
3      <head>
4        <title id=1>First HTML</title>
5      </head>
6      <body>
7        I am your first HTML file!
8      </body>
9    </html>
```



Elements and attributes

Elements and attributes

Elements

Elements are a combination of *start tags*, content, and *end tags*.

Example:

```
1 <title>First HTML</title>
```

Syntax

element title	`title`
start tag	`<title>`
end tag	`</title>`
value	`First HTML`

Elements and attributes

Attributes

Attributes describe elements and are stored in the start tag. In HTML, there are specific attributes for specific elements.

Example:

```
1 <a href="http://www.r-datacollection.com/">Link to Homepage</a>
```

Syntax

- name-value pairs: `name="value"`
- simple and double quotation marks possible
- several attributes per element possible

Important tags and attributes

Why tags and attributes are important

- tags structure HTML documents
- everything that structures a document can be used to extract information
- in the following, we get to know some important tags which are useful when scraping information from the Web

Important tags and attributes

Anchor tag <a>

- links to other pages or resources
- classical links are always formatted with an anchor tag
- the `href` attribute determines the target location
- the value is the name of the link

Link to another resource:

```
1 <a href="en.wikipedia.org/wiki/List_of_lists_of_lists">Link with absolute path</a>
```

Reference in a document:

```
1 <a id="top">Reference Point</a>
```

Link to a reference:

```
1 <a href="#top">Link to Reference Point</a>
```

Important tags and attributes

Heading tags <h1>, <h2>, ..., and paragraph tag <p>

- structure text and paragraphs
- heading tags range from level 1 to 6
- paragraph tag induces line break

Examples:

```
<p>This text is going to be a paragraph one day and separated from other
text by line breaks.</p>
```

```
<h1>heading of level 1 -- this will be BIG</h1>
...
<h6>heading of level 6 -- the smallest heading</h6>
```

Important tags and attributes

Listing tags <ul>, <ol> and <dl>

- the <ol> tag creates a numeric list, <ul> an unnumbered list, <dl> a definition list
- list elements are indicated with the <li> tag

Example:

```
<ul>
        <li>Dogs</li>
        <li>Cats</li>
        <li>Fish</li>
</ul>
```

Important tags and attributes

Organizational tags and

- grouping of content over lines ( ) or within lines ()
- do not change the layout themselves but work together with CSS

Example of CSS definition

```
1  div.happy { color:pink;
2              font-family:"Comic Sans MS";
3              font-size:120% }
4  span.happy { color:pink;
5              font-family:"Comic Sans MS";
6              font-size:120% }
```

In the HTML document

```
1  <div class="happy"><p>I am a happy styled paragraph</p></div>
2  non-happy text with <span class="happy">some happiness</span>
```

Important tags and attributes

Form tag <form>

- allows to incorporate HTML forms
- client can send information to the HTTP server via forms
- whenever you type something into a field or click on radio buttons in your browser, you are interacting with forms

Example:

```
1 <form name="submitPW" action="Passed.html" method="get">
2   password:
3   <input name="pw" type="text" value="">
4   <input type="submit" value="SubmitButtonText">
5 </form>
```

Important tags and attributes

Table tags `<table>`, `<tr>`, `<td>`, and `<th>`

- standard HTML tables always follow a standard architecture
- the different tags allow to define the table as a whole, individual rows (including the heading), and cells
- if the data is hidden in tables, scraping will be straightforward

Example:

```
<table>
  <tr> <th>Rank</th> <th>Nominal GDP</th> <th>Name</th> </tr>
  <tr> <th></th> <th>(per capita, USD)</th> <th></th> </tr>
  <tr> <td>1</td> <td>170,373</td> <td>Lichtenstein</td> </tr>
  <tr> <td>2</td> <td>167,021</td> <td>Monaco</td> </tr>
  <tr> <td>3</td> <td>115,377</td> <td>Luxembourg</td> </tr>
  <tr> <td>4</td> <td>98,565</td> <td>Norway</td> </tr>
  <tr> <td>5</td> <td>92,682</td> <td>Qatar</td> </tr>
</table>
```

Summary

Summary

- HTML is the *lingua franca* on the web
- content on webpages is structured by HTML tags that are nested in a tree structure
- to break open information, we will have to locate it in the HTML tree
- for web scraping purposes, a mostly passive knowledge of HTML is sufficient

Source: https://xkcd.com/1144/ (Randall Munroe)