MAT381E-Week 8: Introduction to Web Scraping

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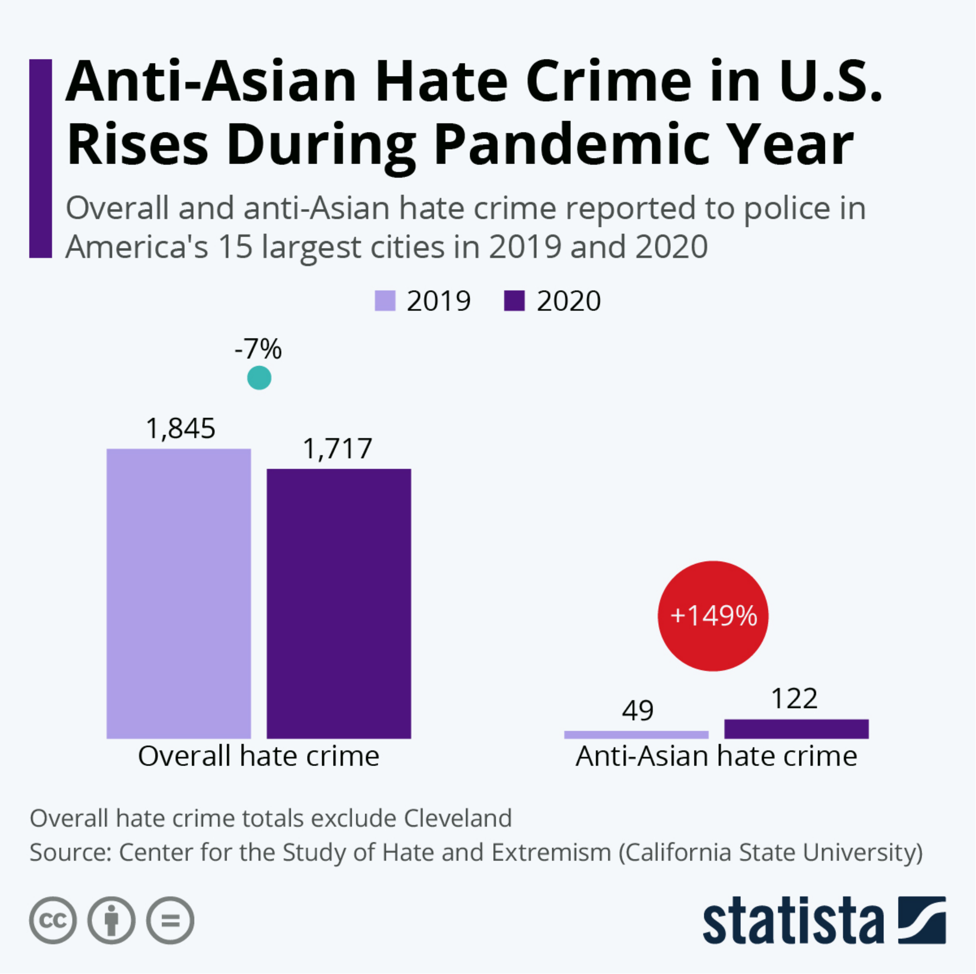
Homework I review

- Turn off warnings and messages in code chunks. It does not look good when you render the documents.
- Do not show whole big data, show a piece of it.
- Do not use View() function in homework/reports since if it forces to open another window.
- library(tidyverse) already involves library(ggplot2) etc. If you write them sequentially, this implies that you do not know the tidyverse ecosystem well.
- Please, do commenting as needed (short comments). The reader does not have to guess what you are doing. You need to navigate the reader.
- Present a well-organized homework/report. This is a sign how you respect your readers.
- Please, do use data science related packages' functions for mathematical operations.
- Please, prefer piping as needed, it increases the code's readability.
- Please, pay attention your project folder design. Keep data related files under data folder, keep image related files under image file etc.
- As in everything, how you present something matters as what you have done.

Outline

- Motivation.
- What is `Web Scraping`?
- `HTML` basics.
- Web scraping with `rvest` package.
- Ethical issues.
- 01-web_scraping.Rmd.

Motivation



Source

- "A survey of police reports by the Center for the Study of Hate and Extremism at California State University confirmed that racially motivated crimes against those of Asian descent in the U.S. have risen in the pandemic year of 2020. **While hate crimes against Asians still make up a smaller fraction of all hate crimes reported in America’s 15 largest cities, their number rose from 49 in 2019 to 122 in 2020.**"
- "Separate reports released by the Stop AAPI Hate reporting center confirm that attacks on Asians were highest in the early days of the pandemic, but also show that they have been rising again lately."
- "Stop AAPI Hate said yesterday that verbal harassment was the most common incident recorded by them at 68 percent of all cases, followed by deliberate shunning (20 percent of cases) and physical attacks (11 percent of cases)."

What is a hate crime?

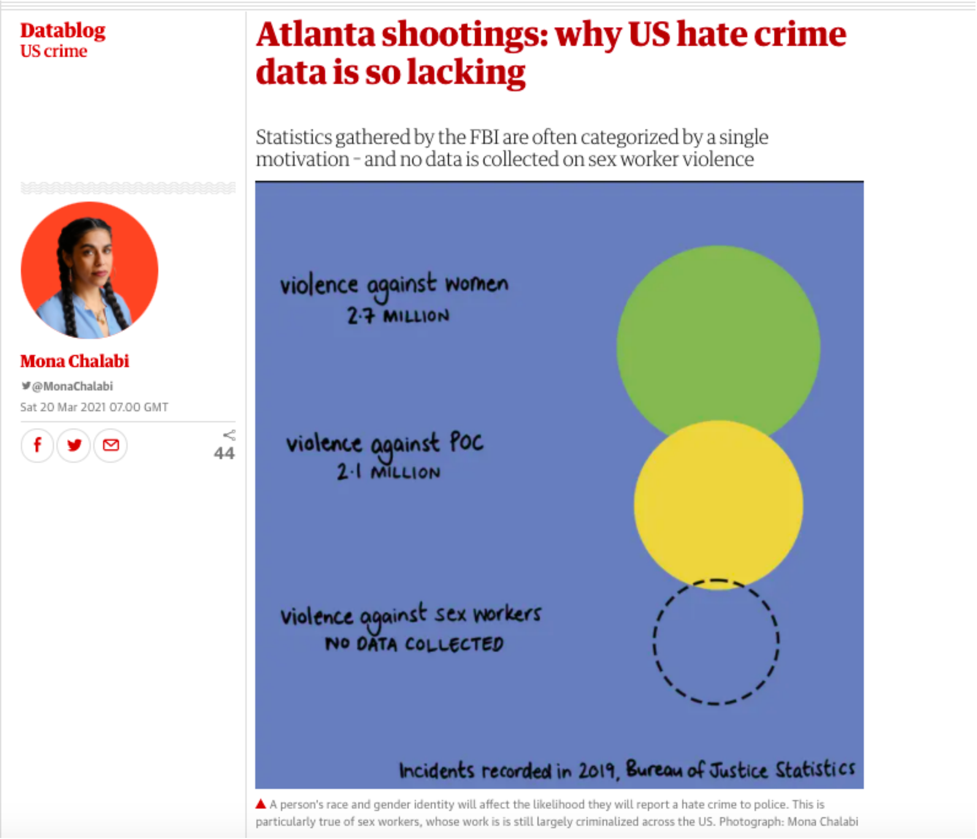
- According to the US Department of Justice: A hate crime is a crime committed on the basis of the victim’s perceived or actual race, color, religion, national origin, sexual orientation, gender, gender identity, or disability.
- The US Department of Justice adds: "Hate crimes have a broader effect than most other kinds of crime. Hate crime victims include not only the crime’s immediate target but also others like them. Hate crimes affect families, communities, and at times, the entire nation, as **others fear that they too could be threatened, attacked, or forced from their homes, because of what they look like, who they are, where they worship, whom they love, or whether they have a disability.**"

Source

Why report hate crimes?

- According to the US Department of Justice: "The Hate Crimes Reporting Gap is the **significant disparity** between hate crimes that actually occur and those reported to law enforcement. It is **critical to report hate crimes** not only to show support and get help for victims, but also to send a clear message that the community will not tolerate these kinds of crimes. Reporting hate crimes allows communities and law enforcement to fully understand the scope of the problem in a community and put resources toward preventing and addressing attacks based on bias and hate."

Lacking Hate Crime Data



Datablog
US crime

Atlanta shootings: why US hate crime data is so lacking

Statistics gathered by the FBI are often categorized by a single motivation - and no data is collected on sex worker violence

Mona Chalabi
@MonaChalabi
Sat 20 Mar 2021 07.00 GMT

44

violence against women
2.7 MILLION
violence against POC
2.1 MILLION
violence against sex workers
NO DATA COLLECTED
Incidents recorded in 2019, Bureau of Justice Statistics

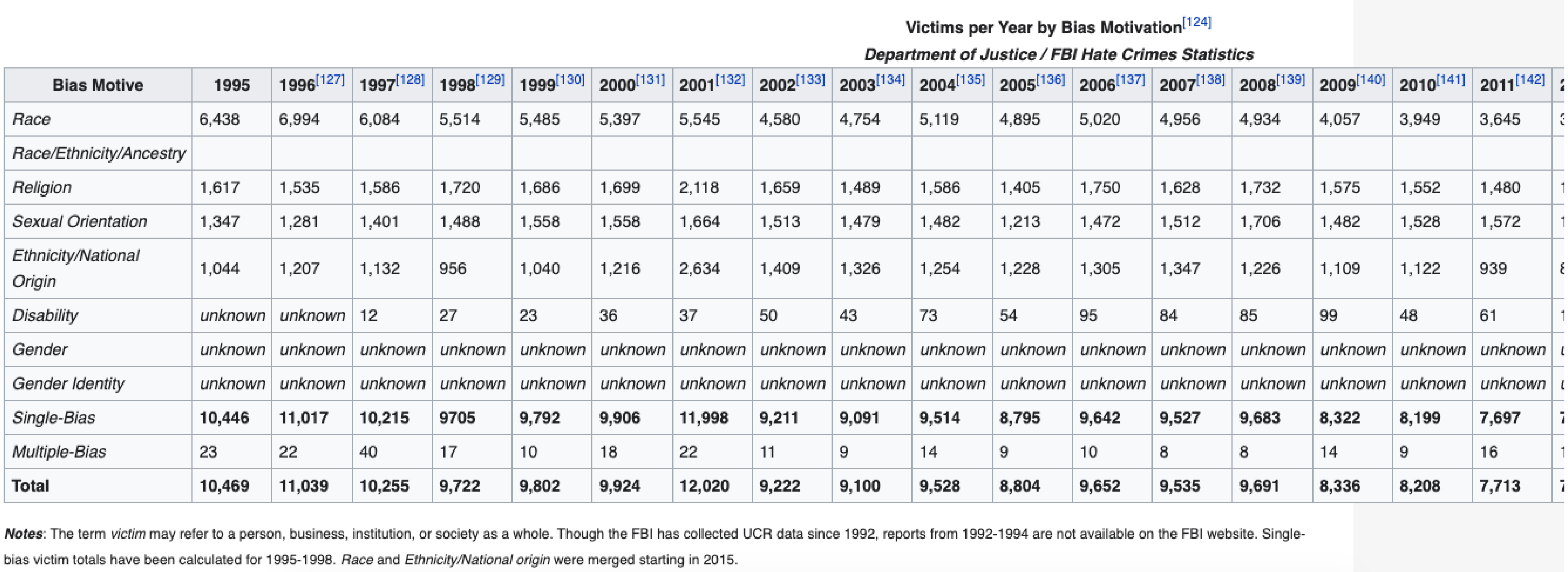
▲ A person's race and gender identity will affect the likelihood they will report a hate crime to police. This is particularly true of sex workers, whose work is is still largely criminalized across the US. Photograph: Mona Chalabi

Source

- "This, of course, ignores the possibility that someone might be motivated by racial hatred and sexism."
- "Unfortunately, most statistics make the same assumption. Hate crime data that is gathered by the FBI is often categorized according to **a single motivation** (such as religion, sexual orientation, race/ethnicity, gender identity). Less than 3% of the hate crimes that were reported in 2019 recorded **multiple biases.**"
- "**Reality is obviously much more complex than these numbers capture.** Things get even more complicated when you consider reporting rates. A person's race and gender identity will affect the likelihood that they will report a hate crime to the police."

Motivating Data

- The data we need to answer a question may not always come in a spreadsheet and be ready for us to read. Sometimes, data can be available on the web.
- For example, following Wikipedia page illustrates **Hate crime statistics by bias motivation in the US** in a `html` table:



Victims per Year by Bias Motivation[124]

Department of Justice / FBI Hate Crimes Statistics

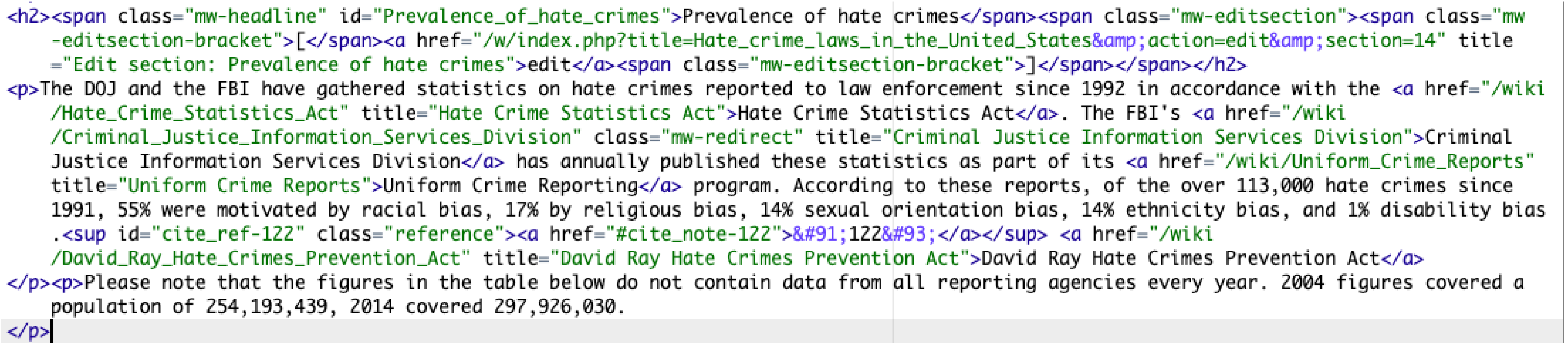
Bias Motive	1995	1996[127]	1997[128]	1998[129]	1999[130]	2000[131]	2001[132]	2002[133]	2003[134]	2004[135]	2005[136]	2006[137]	2007[138]	2008[139]	2009[140]	2010[141]	2011[142]
Race	6,438	6,994	6,084	5,514	5,485	5,397	5,545	4,580	4,754	5,119	4,895	5,020	4,956	4,934	4,057	3,949	3,645
Race/Ethnicity/Ancestry																	
Religion	1,617	1,535	1,586	1,720	1,686	1,699	2,118	1,659	1,489	1,586	1,405	1,750	1,628	1,732	1,575	1,552	1,480
Sexual Orientation	1,347	1,281	1,401	1,488	1,558	1,558	1,664	1,513	1,479	1,482	1,213	1,472	1,512	1,706	1,482	1,528	1,572
Ethnicity/National Origin	1,044	1,207	1,132	956	1,040	1,216	2,634	1,409	1,326	1,254	1,228	1,305	1,347	1,226	1,109	1,122	939
Disability	*unknown*	*unknown*	12	27	23	36	37	50	43	73	54	95	84	85	99	48	61
Gender	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*
Gender Identity	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*	*unknown*
Single-Bias	**10,446**	**11,017**	**10,215**	**9705**	**9,792**	**9,906**	**11,998**	**9,211**	**9,091**	**9,514**	**8,795**	**9,642**	**9,527**	**9,683**	**8,322**	**8,199**	**7,697**
Multiple-Bias	23	22	40	17	10	18	22	11	9	14	9	10	8	8	14	9	16
Total	**10,469**	**11,039**	**10,255**	**9,722**	**9,802**	**9,924**	**12,020**	**9,222**	**9,100**	**9,528**	**8,804**	**9,652**	**9,535**	**9,691**	**8,336**	**8,208**	**7,713**

Notes: The term *victim* may refer to a person, business, institution, or society as a whole. Though the FBI has collected UCR data since 1992, reports from 1992-1994 are not available on the FBI website. Single-bias victim totals have been calculated for 1995-1998. *Race* and *Ethnicity/National origin* were merged starting in 2015.

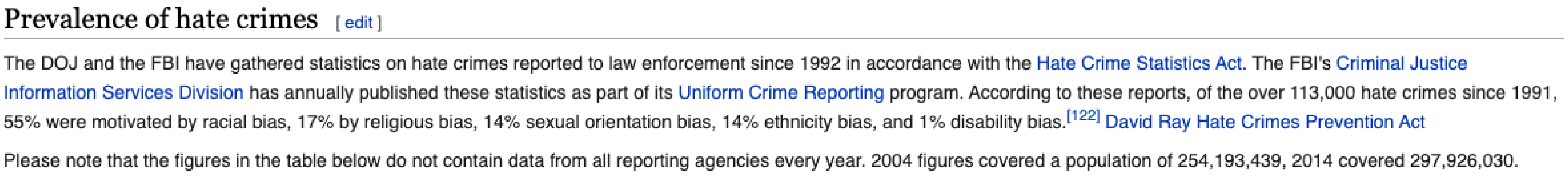
Web Scraping

- **Web scraping** or **web harvesting** are the terms used to describe the process of extracting data from a website.
- The **web pages** are written in a **text** format using **hyper text markup language** (HTML) code.
- Afterwards, they are rendered by **web browsers** to be viewed.
- To see the `HTML` source code for a web page we can visit the page on the *browser*, then we can use the *View Page Source* tool to see it.
- Because `HTML` code is accessible, we can download the `HTML` files, import it into `R`, and then write `R` code to extract the information we need from the page.

- To get an idea of how `HTML` code works, here we show a few lines of code from the Wikipedia page that provides information on US hate statistics:



```
<h2><span class="mw-headline" id="Prevalence_of_hate_crimes">Prevalence of hate crimes</span><span class="mw-editsection"><span class="mw
    -editsection-bracket">[</span><a href="/w/index.php?title=Hate_crime_laws_in_the_United_States&amp;action=edit&amp;section=14" title
    ="Edit section: Prevalence of hate crimes">edit</a><span class="mw-editsection-bracket">]</span></span></h2>
<p>The DOJ and the FBI have gathered statistics on hate crimes reported to law enforcement since 1992 in accordance with the <a href="/wiki
    /Hate_Crime_Statistics_Act" title="Hate Crime Statistics Act">Hate Crime Statistics Act</a>. The FBI's <a href="/wiki
    /Criminal_Justice_Information_Services_Division" class="mw-redirect" title="Criminal Justice Information Services Division">Criminal
    Justice Information Services Division</a> has annually published these statistics as part of its <a href="/wiki/Uniform_Crime_Reports"
    title="Uniform Crime Reports">Uniform Crime Reporting</a> program. According to these reports, of the over 113,000 hate crimes since
    1991, 55% were motivated by racial bias, 17% by religious bias, 14% sexual orientation bias, 14% ethnicity bias, and 1% disability bias
    .<sup id="cite_ref-122" class="reference"><a href="#cite_note-122">&#91;122&#93;</a></sup> <a href="/wiki
    /David_Ray_Hate_Crimes_Prevention_Act" title="David Ray Hate Crimes Prevention Act">David Ray Hate Crimes Prevention Act</a>
</p><p>Please note that the figures in the table below do not contain data from all reporting agencies every year. 2004 figures covered a
    population of 254,193,439, 2014 covered 297,926,030.
</p>
```



Prevalence of hate crimes [edit]

The DOJ and the FBI have gathered statistics on hate crimes reported to law enforcement since 1992 in accordance with the Hate Crime Statistics Act. The FBI's Criminal Justice Information Services Division has annually published these statistics as part of its Uniform Crime Reporting program. According to these reports, of the over 113,000 hate crimes since 1991, 55% were motivated by racial bias, 17% by religious bias, 14% sexual orientation bias, 14% ethnicity bias, and 1% disability bias.[122] David Ray Hate Crimes Prevention Act

Please note that the figures in the table below do not contain data from all reporting agencies every year. 2004 figures covered a population of 254,193,439, 2014 covered 297,926,030.

- Once we look at the full `HTML` source code, we can actually see the text and data along with `HTML` codes.
- We can also see **a pattern** of how it is stored. If you know `HTML`, you can write programs that leverage knowledge of these patterns to extract what we want.
- We also take advantage of a language widely used to make web pages look "pretty" called Cascading Style Sheets (CSS).

HTML basics

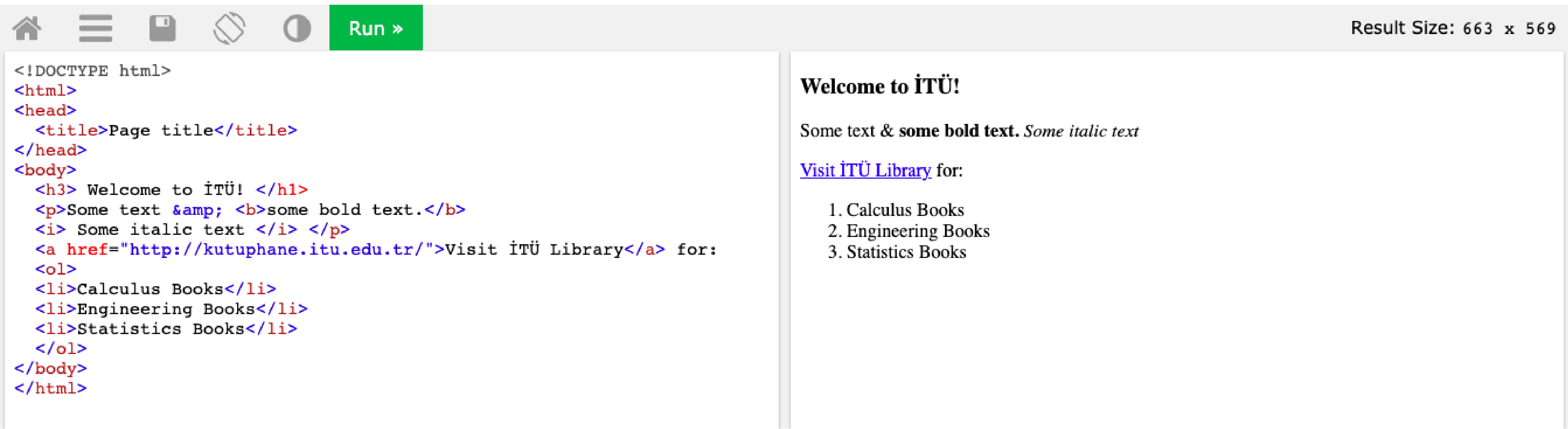
- All HTML documents must start with a document type declaration: `<!DOCTYPE html>`.
- Every HTML page itself must be in an `<html>` element, and it must have **two children**: `<head>`, which contains document metadata like the page title, author etc and `<body>`, which contains the content you see in the browser.

```html
<!DOCTYPE html>
<html>
<head>
  <title>Page title</title>
</head>
<body>
  <h1> Welcome to İTÜ! </h1>
  <p>Some text &amp; <b>some bold text.</b>
  <i> Some italic text </i> </p>
  <a href="http://kutuphane.itu.edu.tr/">Visit İT
  <ol>
  <li>Calculus Books</li>
  <li>Engineering Books</li>
  <li>Statistics Books</li>
  </ol>
</body>
</html>
```

- Each HTML element has a hierarchical structure which consist of a start tag (e.g. `<tag>`), optional attributes (`id='first'`), an end tag (like `</tag>`), and contents (everything in between the start and end tag).
- Block tags like `<h1>` (most important heading 1), `<p>` (paragraph), and `<ol>` (ordered list), `<li>` (list item) form the overall structure of the page.
- Inline tags like `<b>` (bold), `<i>` (italics), and `<a>` (links) formats text inside block tags.
- On the left: The `<a>` tag defines a hyperlink. The `href` **attribute specifies the URL of the page the link goes to**.

- Note: Since `<` and `>` are used for start and end tags, we cannot use them directly.
- Instead we have to use the `HTML` escapes `&gt;` (greater than) and `&lt;` (less than).
- And of couse, since those escapes use `&`, if we want a literal ampersand (and) we have to escape it as `&amp;`.
- If you encounter a tag that you have never seen before, you can find out what it does at WWW3 school.

- Let's try out our `HTML` code at WWW3 school:



```
<!DOCTYPE html>
<html>
<head>
  <title>Page title</title>
</head>
<body>
  <h3> Welcome to İTÜ! </h1>
  <p>Some text &amp; <b>some bold text.</b>
  <i> Some italic text </i> </p>
  <a href="http://kutuphane.itu.edu.tr/">Visit İTÜ Library</a> for:
  <ol>
  <li>Calculus Books</li>
  <li>Engineering Books</li>
  <li>Statistics Books</li>
  </ol>
</body>
</html>
```

Welcome to İTÜ!

Some text & **some bold text.** *Some italic text*

Visit İTÜ Library for:

1. Calculus Books
2. Engineering Books
3. Statistics Books

- More on HTML.

- Some elements, like `<img>` cannot have children. These elements depend solely on **attributes for their behavior**.

```
<img src='logo/rvest.jpg' width="400" height="400">
```

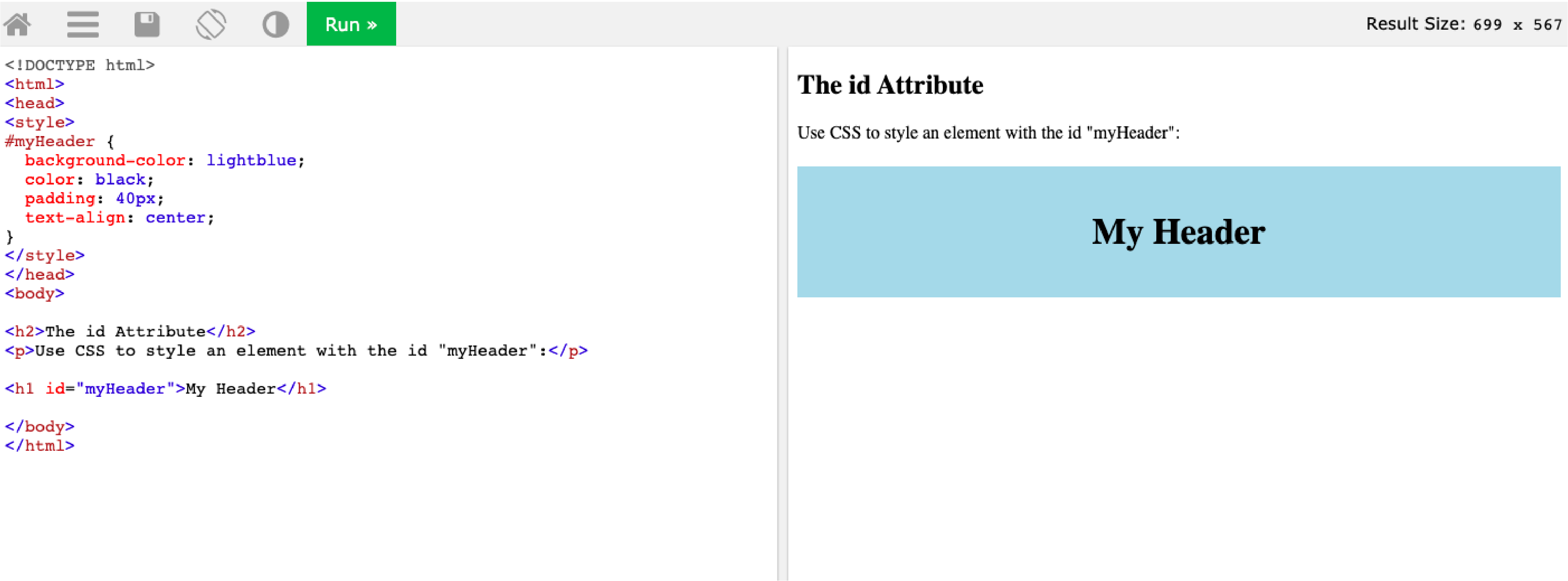
- Here, `src` attribute specifies the path (URL) to the image; `width` and `height` attributes define the `width` and `height` of the image in **pixels**.

Named attributes

- Sometimes, the start tags of `HTML` elements can have **named attributes** which look like `<tag name1='value1'> Content </tag>`.
- Two of the most important named attributes are `id` and `class`, which are used in conjunction with `CSS` to **control the visual appearance** of the page. These are often useful when scraping data off a page.
- Note that attributes are always specified in the start tag.

id attribute

- The `id` attribute is used to point to a specific style declaration in a **style element within head** and the value of the `id` attribute must be **unique** within the `HTML` document.
- The syntax for `id` is: write a hash character (`#`), followed by an `id name`. Then, define the CSS properties within curly braces `{}`.



```
<!DOCTYPE html>
<html>
<head>
<style>
#myHeader {
  background-color: lightblue;
  color: black;
  padding: 40px;
  text-align: center;
}
</style>
</head>
<body>

<h2>The id Attribute</h2>
<p>Use CSS to style an element with the id "myHeader":</p>

<h1 id="myHeader">My Header</h1>

</body>
</html>
```

The id Attribute

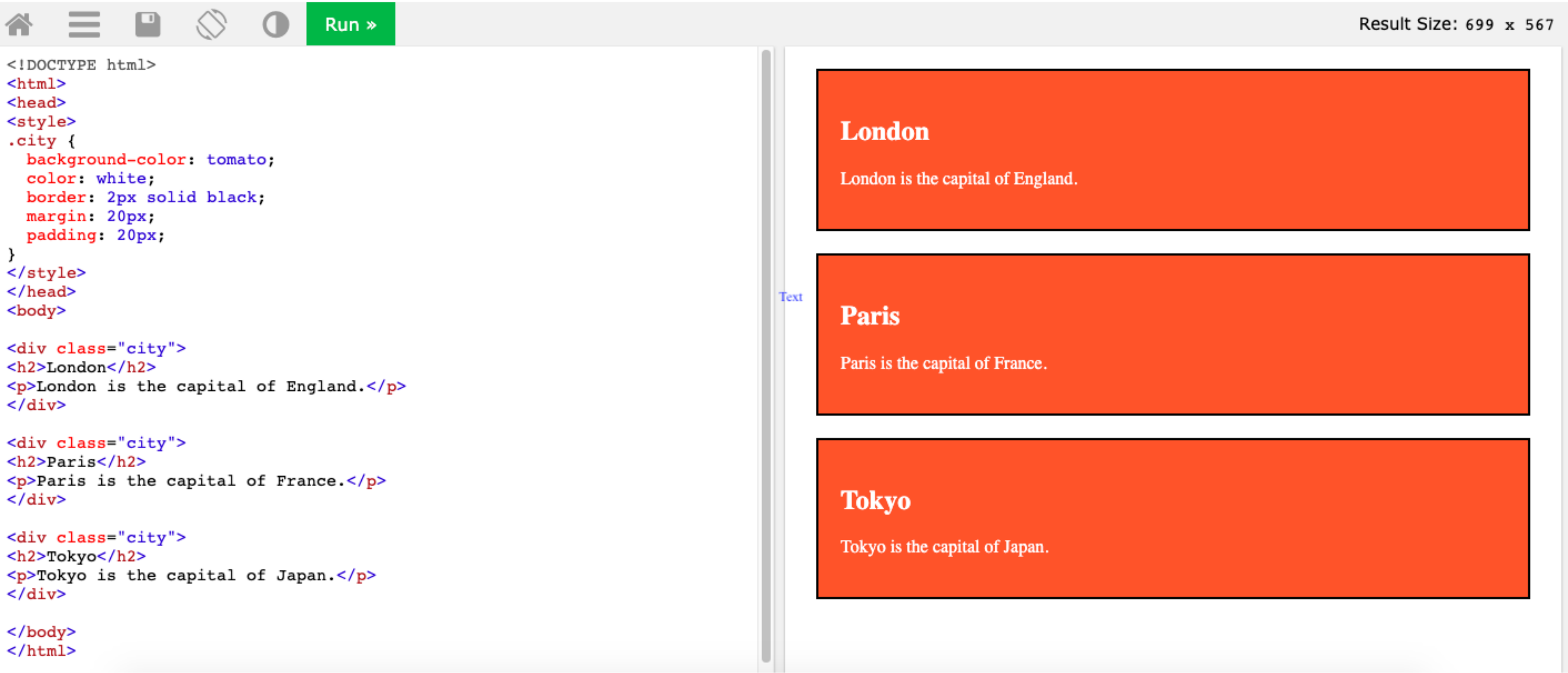
Use CSS to style an element with the id "myHeader":

My Header

Source1 and Source2

class attribute

- The `class` attribute is often used to point to a class name in a style sheet. Multiple `HTML` elements can share the same class.
- The syntax for `class` is: write a period character (`.`), followed by an `class name`. Then, define the CSS properties within curly braces `{}`.



```
<!DOCTYPE html>
<html>
<head>
<style>
.city {
  background-color: tomato;
  color: white;
  border: 2px solid black;
  margin: 20px;
  padding: 20px;
}
</style>
</head>
<body>

<div class="city">
<h2>London</h2>
<p>London is the capital of England.</p>
</div>

<div class="city">
<h2>Paris</h2>
<p>Paris is the capital of France.</p>
</div>

<div class="city">
<h2>Tokyo</h2>
<p>Tokyo is the capital of Japan.</p>
</div>

</body>
</html>
```

London

London is the capital of England.

Paris

Paris is the capital of France.

Tokyo

Tokyo is the capital of Japan.

Source1 and Source2

- Note that main difference between `id` and `class` attribute is that `id` is unique in a page and can only apply to **at most one HTML element**, while `class` attribute can be applied to **multiple HTML elements**.

Rvest

The rvest package

- The rvest package provides web harvesting tools within tidyverse ecosystem.

```r
# rvest is not within the core tidyverse ecosystem
# library(tidyverse) will not load rvest package
# load rvest package by library(rvest) call specifically
library(rvest)
```

- The rvest manual tells us that it depends on a few other packages including `xml2`. This enables us to use functions available in these packages as well.

Function	Description
`read_html()`	takes a string that can be either a path, a url and then creates a HTML document from a webpage.

- Here are basic `rvest` functions:

Function	Description
`html_elements()`	select specified elements with the specified tags from the HTML document.
`html_table()`	extract table, to be used after `html_elements()`.
`html_text()`	extract text within tags, to be used after `html_elements()`.
`html_attr()`	extract the value of attribute, to be used after `html_elements()`.

- The first step in using this package is to import the web page, you are interested in, into R.

```r
# Use `read_html()`: to read HTML data from a url or character string into R.
url <- "https://en.wikipedia.org/wiki/Hate_crime_laws_in_the_United_States"
h   <- read_html(url)
h
```

```
#> {html_document}
#> <html class="client-nojs" lang="en" dir="ltr">
#> [1] <head>\n<meta http-equiv="Content-Type" content="text/html; charset=UTF-8 ...
#> [2] <body class="mediawiki ltr sitedir-ltr mw-hide-empty-elt ns-0 ns-subject  ...
```

- Note that the entire Wikipedia webpage is now contained in `h` object:

```
h
```

```
#> {html_document}
#> <html class="client-nojs" lang="en" dir="ltr">
#> [1] <head>\n<meta http-equiv="Content-Type" content="text/html; charset=UTF-8 ...
#> [2] <body class="mediawiki ltr sitedir-ltr mw-hide-empty-elt ns-0 ns-subject  ...
```

- The `h` object is a *list* (`R` data type) and the items in the `h` object correspond to the basic document structure of an `HTML` document.
- Displaying the `h` object shows that the first item in the *list* is `head` and the second item is `body`.
- Note that these items include the basic component of the `HTML` document, in other words, the *text, links*, and HTML "stuff" which were scraped from the web page.
- Specifically this stuff is found in the *body* element of the `h` *list*.

```r
library(xml2)
xml_child(h, 1)
```

```
#> {html_node}
#> <head>
#>  [1] <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">\n
#>  [2] <meta charset="UTF-8">\n
#>  [3] <title>Hate crime laws in the United States - Wikipedia</title>\n
#>  [4] <script>document.documentElement.className="client-js";RLCONF={"wgBreakF ...
#>  [5] <script>(RLQ=window.RLQ||[]).push(function(){mw.loader.implement("user.o ...
#>  [6] <link rel="stylesheet" href="/w/load.php?lang=en&amp;modules=ext.cite.st ...
#>  [7] <script async="" src="/w/load.php?lang=en&amp;modules=startup&amp;only=s ...
#>  [8] <meta name="ResourceLoaderDynamicStyles" content="">\n
#>  [9] <link rel="stylesheet" href="/w/load.php?lang=en&amp;modules=site.styles ...
#> [10] <meta name="generator" content="MediaWiki 1.38.0-wmf.9">\n
#> [11] <meta name="referrer" content="origin">\n
#> [12] <meta name="referrer" content="origin-when-crossorigin">\n
#> [13] <meta name="referrer" content="origin-when-cross-origin">\n
#> [14] <meta name="format-detection" content="telephone=no">\n
#> [15] <meta property="og:title" content="Hate crime laws in the United States  ...
#> [16] <meta property="og:type" content="website">\n
#> [17] <link rel="preconnect" href="//upload.wikimedia.org">\n
#> [18] <link rel="alternate" media="only screen and (max-width: 720px)" href="/ ...
#> [19] <link rel="alternate" type="application/x-wiki" title="Edit this page" h ...
#> [20] <link rel="apple-touch-icon" href="/static/apple-touch/wikipedia.png">\n
#> ...
```

```r
library(xml2)
xml_child(h, 2)
```

```
#> {html_node}
#> <body class="mediawiki ltr sitedir-ltr mw-hide-empty-elt ns-0 ns-subject mw-editable page-Hate_crime_la
#> [1] <div id="mw-page-base" class="noprint"></div>
#> [2] <div id="mw-head-base" class="noprint"></div>
#> [3] <div id="content" class="mw-body" role="main">\n\t<a id="top"></a>\n\t<di ...
#> [4] <div id="mw-data-after-content">\n\t<div class="read-more-container"></di ...
#> [5] <div id="mw-navigation">\n\t<h2>Navigation menu</h2>\n\t<div id="mw-head" ...
#> [6] <footer id="footer" class="mw-footer" role="contentinfo"><ul id="footer-i ...
#> [7] <script>(RLQ=window.RLQ||[]).push(function(){mw.config.set({"wgPageParseR ...
#> [8] <script type="application/ld+json">{"@context":"https:\\/\\/schema.org"," ...
#> [9] <script>(RLQ=window.RLQ||[]).push(function(){mw.config.set({"wgBackendRes ...
```

Extract a table

- Now, question is "**how do we extract the table from the object `h`?**"
- Remember that `HTML` code has a hierarchical tree structure. The different parts of an `HTML` code, often defined with a message in between `<` and `>` are referred to as **nodes** (in other words, **tags**).
- When we know that the information is stored in an `HTML table`, we can see this in the `HTML code` with `<table>` tags.
- To extract a table from the `h` *list*, then we need to gather all the `HTML` code within the `<table>` tags in the `h` *list*.
- You can learn more about the `<table>` tag structure from HTML documentation.

- The rvest package includes functions to extract nodes of an HTML document: the function html_elements() extracts all nodes of different type and html_element() extracts the first one. To extract all tables we use:

```
wiki_tables <- h %>%
               html_elements("table")
```

```
# note that in HTML source code there are currently 4 tables!..
# pages are up to change!..
wiki_tables
```

```
#> {xml_nodeset (4)}
#> [1] <table class="box-Cite_check plainlinks metadata ambox ambox-content" rol ...
#> [2] <table class="wikitable">\n<caption>\n</caption>\n<tbody>\n<tr>\n<th>Stat ...
#> [3] <table class="wikitable" style="margin: 1em auto 1em auto">\n<caption>\n< ...
#> [4] <table class="wikitable" style="margin: 1em auto 1em auto">\n<caption>\n< ...
```

- Now, instead of the entire web page, we just have the HTML code for the **tables only**:

- But we want the table titled "Victims per Year by Bias Motivation" on the page.
- Looking at the output above it looks like the **table index** is [3]. To extract just the third table - the table with the data we are interested in - we can type the following:

```
victim_table <- wiki_tables %>% .[3]
# subsetting with square brackets while piping: .[]
victim_table
```

```
#> {xml_nodeset (1)}
#> [1] <table class="wikitable" style="margin: 1em auto 1em auto">\n<caption>\n< ...
```

- We are not quite there yet because this is **not a data frame**.
- In fact, `rvest` includes a function just for converting `HTML` tables into data frames:

```
#html_table() #returns a list and get the first component
victim_table_df <- victim_table %>%
                      html_table()  %>% .[[1]]
```

```
View(victim_table_df)
class(victim_table_df) #returns a data frame
```

- We are still not done because this is clearly not a **tidy data set**.

```
str(victim_table_df)
```

- Change the column names properly, replace "unknown" and empty spaces with NA, then remove the commas and turn character variables into numeric.

```
library(dplyr)
table_tidy <- victim_table_df  %>%
               setNames(c("Bias Motive", paste(c(1995:2018), sep=""))) %>% #change the column names
               #mutate_at(vars("1995":"2018"), as.numeric)   #did not work!help needed #NAs did not
               mutate_at(vars("1995":"2018"), funs(gsub(',', '',.))) %>% #remove commas #discuss!!!
               mutate_at(vars("1995":"2018"), as.numeric) #change the columns except bias motive in
               #na_if("unknown") %>%
               #na_if("") %>%
#https://github.com/tidyverse/readxl/issues/572
               ###mutate_at(vars("1995":"2018"), as.numeric)
# https://stackoverflow.com/questions/46787515/remove-commas-from-character-vectors-based-on-specif
```

```
#not desired format, but let's continue!.(Some rows should be empty, not NA)
View(table_tidy)
```

- Finally, let's get the final look of the table!..

```r
#More on HTML tables: https://haozhu233.github.io/kableExtra/awesome_table_in_html.html
library(kableExtra)
table_tidy %>%
  kbl() %>%
  kable_paper() %>%
  scroll_box(width = "1000px", height = "400px") #add a scroll-box
```

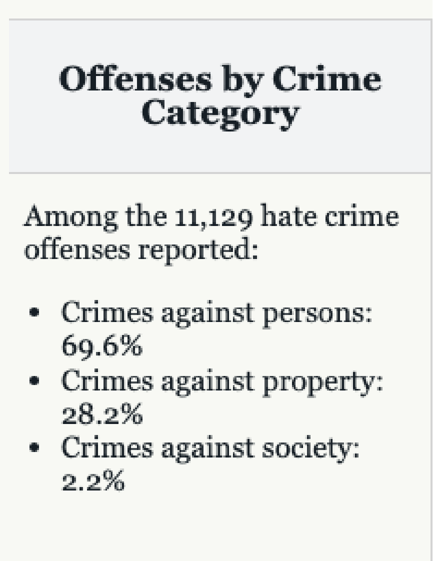
Bias Motive	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Race	6438	6994	6084	5514	5485	5397	5545	4580	4754	5119	4895	5020	4956	4934	4057	3949
Race/Ethnicity/Ancestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Religion	1617	1535	1586	1720	1686	1699	2118	1659	1489	1586	1405	1750	1628	1732	1575	1552
Sexual Orientation	1347	1281	1401	1488	1558	1558	1664	1513	1479	1482	1213	1472	1512	1706	1482	1528
Ethnicity/National Origin	1044	1207	1132	956	1040	1216	2634	1409	1326	1254	1228	1305	1347	1226	1109	1122
Disability	NA	NA	12	27	23	36	37	50	43	73	54	95	84	85	99	48
Gender	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gender Identity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Exract Text

Data Code

- Let's assume that you want to extract the following unordered list at the US Department of Justice:

```
knitr::include_graphics('images/offense.png')
```



Offenses by Crime Category

Among the 11,129 hate crime offenses reported:

- Crimes against persons: 69.6%
- Crimes against property: 28.2%
- Crimes against society: 2.2%

Exract image URL

- Let's say we would like to import the image of "ortanca" at https://www.bitkivt.itu.edu.tr/vt/report.php?sor=665 into the R.

```
image  <- read_html("https://www.bitkivt.itu.edu.tr/vt/report.php?sor=665")
```

```
image_url <- image %>%
              html_elements("img") %>%
              html_attr("src") %>% .[3] #we need third url
```

```
#library magick is for image editing (reading, writing, and joining).
library(magick)
magick::image_read(image_url)
```

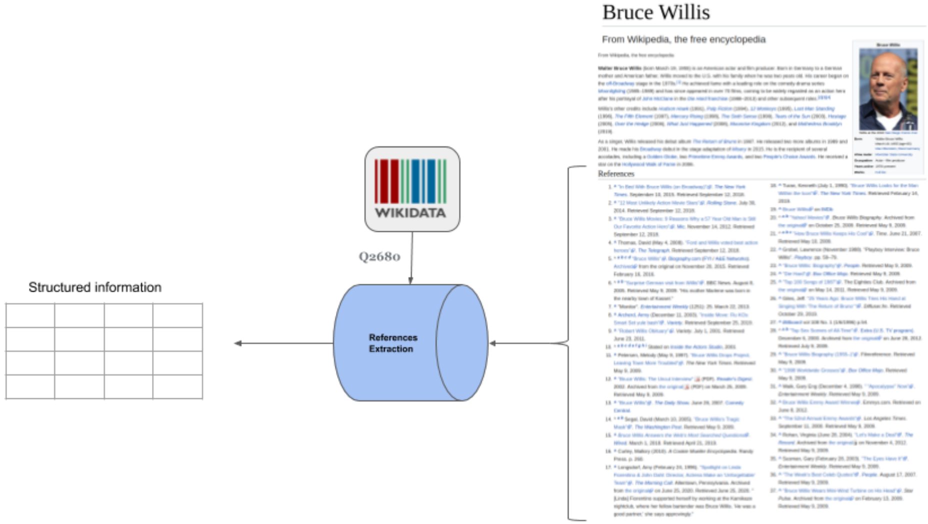
News

misinfocon.com/scribes-reference-api-enables-users-to-access-wikipedia...

Scribe’s Reference API enables users to access Wikipedia references

Lucie-Aimée Kaffee Follow

Mar 25 · 4 min read

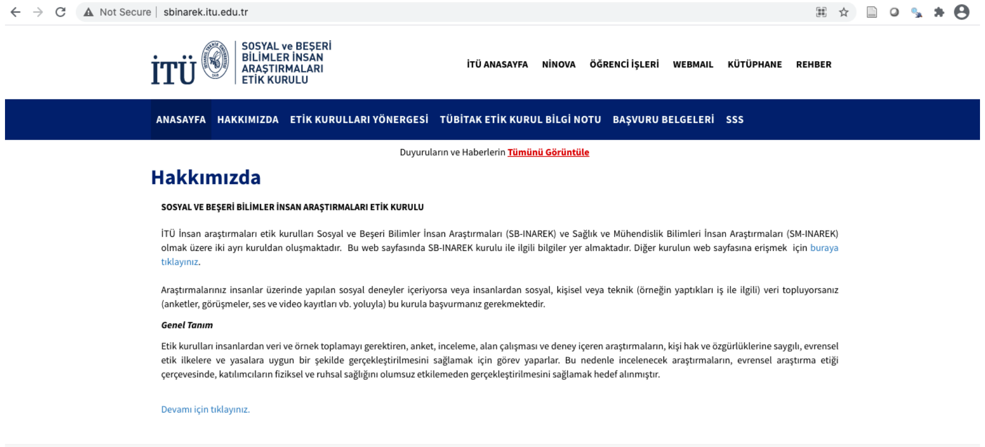


- Scribe says that:
  - "We, therefore, started the Scribe credibility API. The goal was to make the Wikipedia references not only accessible to anyone but also queryable. We implemented this in two steps: (1) extracting Wikipedia references, and (2) setting up an API to query the references."
  - "We extract Wikipedia references from the Wikipedia dump and enrich it with Wikidata information, such as the entity ID in Wikidata. This data is saved as structured data in the database. We focus on online references, i.e., references that include a URL."
  - YOUR TURN?

Ethical considerations

- Legal Concerns:
  - If internet data is publicly available (e.g., tweets from a public Twitter account), it is **generally considered legal** to collect this data.
  - Research that involves human participants (e.g., surveys, interviews, blood draws) needs to be approved by the Institutional Ethics Committee.

- "İTÜ İnsan araştırmaları etik kurulları Sosyal ve Beşeri Bilimler İnsan Araştırmaları (SB-INAREK) ve Sağlık ve Mühendislik Bilimleri İnsan Araştırmaları (SM-INAREK) olmak üzere iki ayrı kuruldan oluşmaktadır."



Duyuruların ve Haberlerin Tümünü Görüntüle

Hakkımızda

SOSYAL VE BEŞERİ BİLİMLER İNSAN ARAŞTIRMALARI ETİK KURULU

İTÜ İnsan araştırmaları etik kurulları Sosyal ve Beşeri Bilimler İnsan Araştırmaları (SB-INAREK) ve Sağlık ve Mühendislik Bilimleri İnsan Araştırmaları (SM-INAREK) olmak üzere iki ayrı kuruldan oluşmaktadır. Bu web sayfasında SB-INAREK kurulu ile ilgili bilgiler yer almaktadır. Diğer kurulun web sayfasına erişmek için buraya tıklayınız.

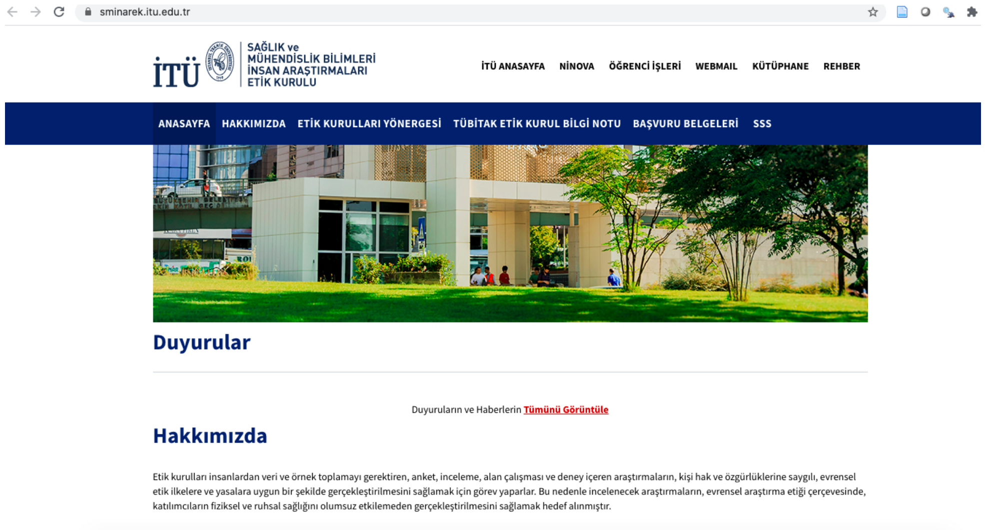
Araştırmalarınız insanlar üzerinde yapılan sosyal deneyler içeriyorsa veya insanlardan sosyal, kişisel veya teknik (örneğin yaptıkları iş ile ilgili) veri topluyorsanız (anketler, görüşmeler, ses ve video kayıtları vb. yoluyla) bu kurula başvurmanız gerekmektedir.

Genel Tanım

Etik kurulları insanlardan veri ve örnek toplamayı gerektiren, anket, inceleme, alan çalışması ve deney içeren araştırmaların, kişi hak ve özgürlüklerine saygılı, evrensel etik ilkelere ve yasalara uygun bir şekilde gerçekleştirilmesini sağlamak için görev yaparlar. Bu nedenle incelenecek araştırmaların, evrensel araştırma etiği çerçevesinde, katılımcıların fiziksel ve ruhsal sağlığını olumsuz etkilemeden gerçekleştirilmesini sağlamak hedef alınmıştır.

Devamı için tıklayınız.

Source



Duyurular

Duyuruların ve Haberlerin Tümünü Görüntüle

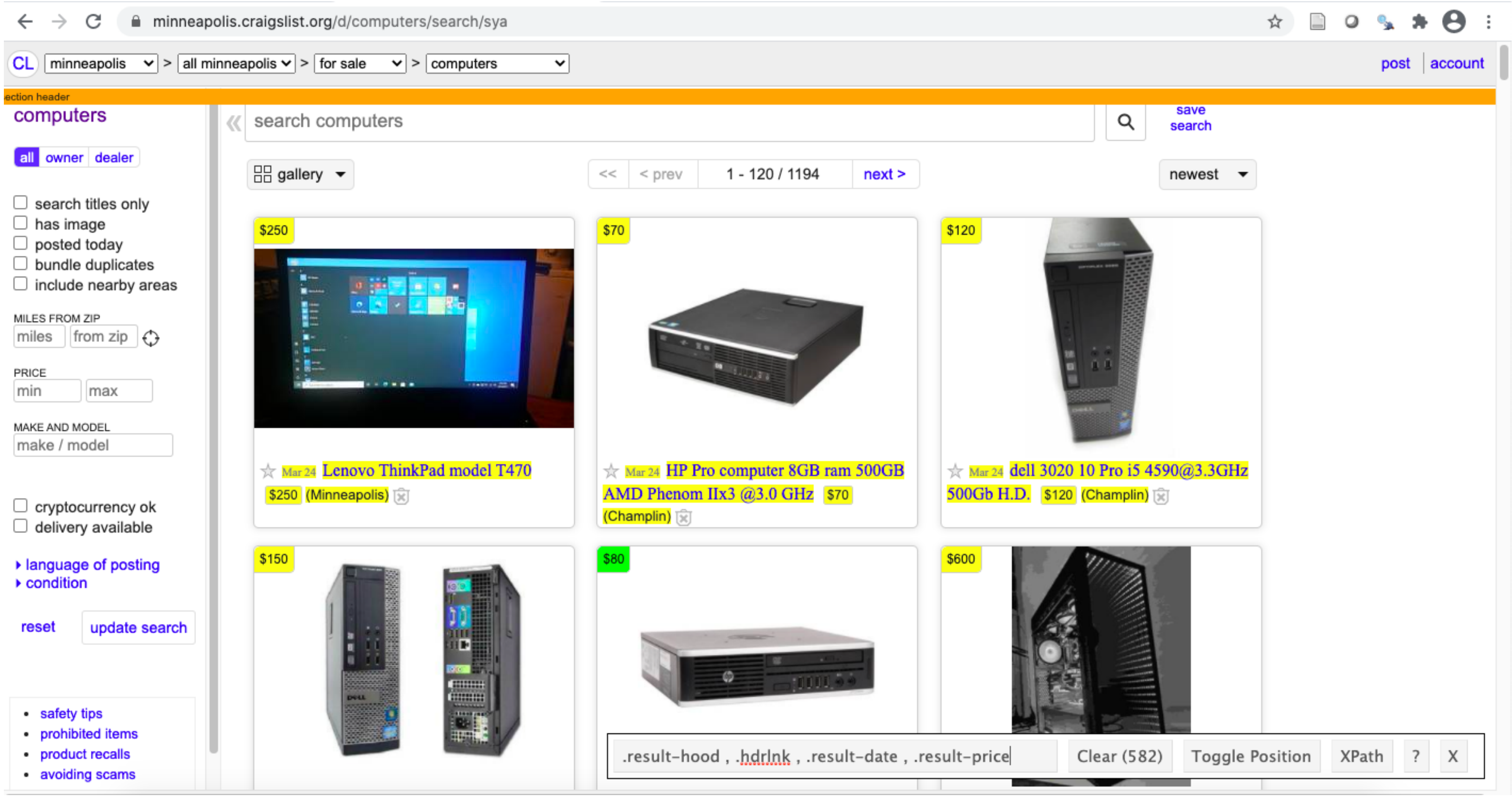
Hakkımızda

Etik kurulları insanlardan veri ve örnek toplamayı gerektiren, anket, inceleme, alan çalışması ve deney içeren araştırmaların, kişi hak ve özgürlüklerine saygılı, evrensel etik ilkelere ve yasalara uygun bir şekilde gerçekleştirilmesini sağlamak için görev yaparlar. Bu nedenle incelenecek araştırmaların, evrensel araştırma etiği çerçevesinde, katılımcıların fiziksel ve ruhsal sağlığını olumsuz etkilemeden gerçekleştirilmesini sağlamak hedef alınmıştır.

Source

- But it is still not certain whether research about publicly available internet data require Institutional Ethics Committee approval or not.
- User Ethics:
  - According to this information:
    "Just because something is legal does not mean it is ethical. Collecting, sharing, and publishing internet data created by or about individuals can lead to unwanted public scrutiny, harm, and other negative consequences for those individuals. There is no single, simple answer to the many difficult questions raised by internet data collection. It is important to develop an ethical framework that responds to the specifics of your particular research project or use case (e.g., the platform, the people involved, the context, the potential consequences, etc.)."

- **Hands-on example:** Visit `01-web_scraping.Rmd` file for data harvesting from craiglist.



minneapolis.craigslist.org/d/computers/search/sya

CL minneapolis > all minneapolis > for sale > computers

computers

search computers

1 - 120 / 1194

☆ Mar 24 Lenovo ThinkPad model T470 $250 (Minneapolis)

☆ Mar 24 HP Pro computer 8GB ram 500GB AMD Phenom IIx3 @3.0 GHz $70 (Champlin)

☆ Mar 24 dell 3020 10 Pro i5 4590@3.3GHz 500Gb H.D. $120 (Champlin)

.result-hood , .hdrlnk , .result-date , .result-price

- More on web scraping:
    - https://www.r-bloggers.com/2020/01/web-scraping-with-rvest-astro-throwback/
    - https://www.storybench.org/scraping-html-tables-and-downloading-files-with-r/
    - https://cran.r-project.org/web/packages/RSelenium/vignettes/basics.html.

Attributions

- rvest.
- Data Science Labs.
- Ethics.
- CSS Selectors.