

# Web Scraping Tables using Pandas

Estimated Effort: 5 mins

The Pandas library in Python contains a function `read_html()` that can be used to extract tabular information from any web page.

Consider the following example:

Let us assume we want to extract the list of the largest banks in the world by market capitalization, from the following link:

```
URL = 'https://en.wikipedia.org/wiki/List_of_largest_banks'
```

We may use `pandas.read_html()` function in python to extract all the tables in the web page directly.

A snapshot of the webpage is shown below.

The screenshot shows a web browser window with the URL `https://en.wikipedia.org/wiki/List_of_largest_banks` in the address bar. The page title is "List of largest banks". The left sidebar includes links for "Contents [hide]", "(Top)", "By market capitalization", "By total assets", "Banks by country or territory", "See also", and "References". The main content area starts with a section titled "By market capitalization [edit]". Below it, a note states: "The list is based on Forbes.com's ranking as of August 2023 based on an analysis of the banking industry's global economy. [1]" A table is displayed, showing the top 10 largest banks by market capitalization in US\$ billion:

Rank	Bank name	Market cap [hide] (US\$ billion)
1	JPMorgan Chase	419.25
2	Bank of America	231.52
3	Industrial and Commercial Bank of China	194.56
4	Agricultural Bank of China	160.68
5	HDFC Bank	157.91
6	Wells Fargo	155.87
7	HSBC Holdings PLC	148.90
8	Morgan Stanley	140.83
9	China Construction Bank	139.82
10	Bank of China	136.81

We can see that the required table is the first one in the web page.

Note: This is a live web page and it may get updated over time. The image shown above has been captured in November 2023. The process of data extraction remains the same.

We may execute the following lines of code to extract the required table from the web page.

```
import pandas as pd
URL = 'https://en.wikipedia.org/wiki/List_of_largest_banks'
tables = pd.read_html(URL)
```

```
df = tables[0]
print(df)
```

This will extract the required table as a dataframe df. The output of the print statement would look as shown below.

Rank		Bank name	Market cap(US\$ billion)
0	1	JPMorgan Chase	419.25
1	2	Bank of America	231.52
2	3	Industrial and Commercial Bank of China	194.56
3	4	Agricultural Bank of China	160.68
4	5	HDFC Bank	157.91
5	6	Wells Fargo	155.87
6	7	HSBC Holdings PLC	148.90
7	8	Morgan Stanley	140.83
8	9	China Construction Bank	139.82
9	10	Bank of China	136.81

Although convenient, this method comes with its own set of limitations.

Firstly, web pages may have content saved in them as tables but they may not appear as tables on the web page.

For instance, consider the following URL showing the list of countries by GDP (nominal).

```
URL = 'https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal)'
```

The images on the web page are also saved in tabular format. A snapshot of the web page is shared below.

### List of countries by GDP (nominal)



Table 1

Table 2

### Table

The table initially ranks each country or territory with their latest available estimates, and can be reranked by either of the sources.

The links in the "Country/Territory" row of the following table link to the article on the GDP or the economy of the respective country or territory.

Country/Territory	UN region	World Bank <sup>[14]</sup>			United Nations <sup>[15]</sup>		
		Forecast	Year	Estimates	Year	Estimates	Year
World	—	104,476,432	2023	100,662,011	2022	98,698,006	2021
1 United States	Americas	26,949,643	2023	25,462,700	2022	23,315,081	2021
2 China	Asia	17,700,899	[n 1] 2023	17,963,171	[n 2] 2022	17,734,131	[n 3] 2021
3 Germany	Europe	4,429,838	2023	4,072,192	2022	4,259,935	2021
4 Japan	Asia	4,230,862	2023	4,231,141	2022	4,940,878	2021
5 India	Asia	3,732,224	2023	3,385,090	2022	3,201,471	2021
6 United Kingdom	Europe	3,332,059	2023	3,070,668	2022	3,131,378	2021
7 France	Europe	3,049,016	2023	2,782,905	2022	2,957,880	2021
8 Italy	Europe	2,186,082	2023	2,010,432	2022	2,107,703	2021
9 Brazil	Americas	2,126,809	2023	1,920,096	2022	1,608,981	2021
10 Canada	Americas	2,117,805	2023	2,139,840	2022	1,988,336	2021
11 Russia	Europe	1,862,470	2023	2,240,422	2022	1,778,782	2021
12 Mexico	Americas	1,811,468	2023	1,414,187	2022	1,272,839	2021
13 South Korea	Asia	1,709,232	2023	1,665,246	2022	1,810,966	2021
14 Australia	Oceania	1,687,713	2023	1,675,419	2022	1,734,532	2021
15 Spain	Europe	1,582,054	2023	1,397,509	2022	1,427,381	2021
17 Turkey	Asia	1,154,805	2023	905,968	2022	819,034	2021

Table 3

Secondly, the contents of the tables in the web pages may contain elements such as hyperlink text and other denoters, which are also scraped directly using the pandas method. This may lead to a requirement of further cleaning of data.

A closer look at table 3 in the image shown above indicates that there are many hyperlink texts which are also going to be treated as information by the pandas function.

### GDP (USD million) by country

Country/Territory	UN region	IMF <sup>[1][13]</sup>		World Bank <sup>[14]</sup>		United Nations <sup>[15]</sup>	
		Forecast	Year	Estimate	Year	Estimate	Year
World	—	104,476,432	2023	100,562,011	2022	96,698,005	2021
1 United States	Americas	26,949,643	2023	25,462,700	2022	23,315,081	2021
2 China	Asia	17,700,899	[n 1] 2023	17,963,171	[n 2] 2022	17,734,131	[n 3] 2021
3 Germany	Europe	4,429,838	2023	4,072,192	2022	4,259,935	2021
4 Japan	Asia	4,230,862	2023	4,231,141	2022	4,940,878	2021
5 India	Asia	3,732,224	2023	3,385,090	2022	3,201,471	2021
6 United Kingdom	Europe	3,332,059	2023	3,070,668	2022	3,131,378	2021
7 France	Europe	3,049,016	2023	2,782,905	2022	2,957,880	2021
8 Italy	Europe	2,186,082	2023	2,010,432	2022	2,107,703	2021
9 Brazil	Americas	2,126,809	2023	1,920,096	2022	1,608,981	2021
10 Canada	Americas	2,117,805	2023	2,139,840	2022	1,988,336	2021
11 Russia	Europe	1,862,470	2023	2,240,422	2022	1,778,782	2021
12 Mexico	Americas	1,811,468	2023	1,414,187	2022	1,272,839	2021
13 South Korea	Asia	1,709,232	2023	1,665,246	2022	1,810,966	2021
14 Australia	Oceania	1,687,713	2023	1,675,419	2022	1,734,532	2021
15 Spain	Europe	1,582,054	2023	1,397,509	2022	1,427,381	2021

We can extract the table using the code shown below.

```
import pandas as pd
```

```

URL = 'https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal)'
tables = pd.read_html(URL)
df = tables[2] # the required table will have index 2
print(df)

```

The output of the print statement is shown below.

	Country/Territory	UN region	IMF[1][13]		World Bank[14]		United Nations[15]	
	Country/Territory	UN region	Forecast	Year	Estimate	Year	Estimate	
0	World	-	104476432	2023	100562011	2022	96698005	
1	United States	Americas	26949643	2023	25462700	2022	23315081	
2	China	Asia	17700899	[n 1]2023	17963171	[n 3]2022	17734131	[n 1]2022
3	Germany	Europe	4429838	2023	4072192	2022	4259935	
4	Japan	Asia	4230862	2023	4231141	2022	4940878	
..	...	...	...	...	...	...	...	...
209	Palau	Oceania	267	2023	-	-	218	
210	Kiribati	Oceania	246	2023	223	2022	227	
211	Nauru	Oceania	150	2023	151	2022	155	
212	Montserrat	Americas	-	-	-	-	72	
213	Tuvalu	Oceania	63	2023	60	2022	60	

Note that the hyperlink texts have also been retained in the code output.

It is further prudent to point out, that this method exclusively operates only on tabular data extraction. BeautifulSoup library still remains the default method of extracting any kind of information from web pages.

## Author(s)

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