Mahitha Valluru

Homework 7

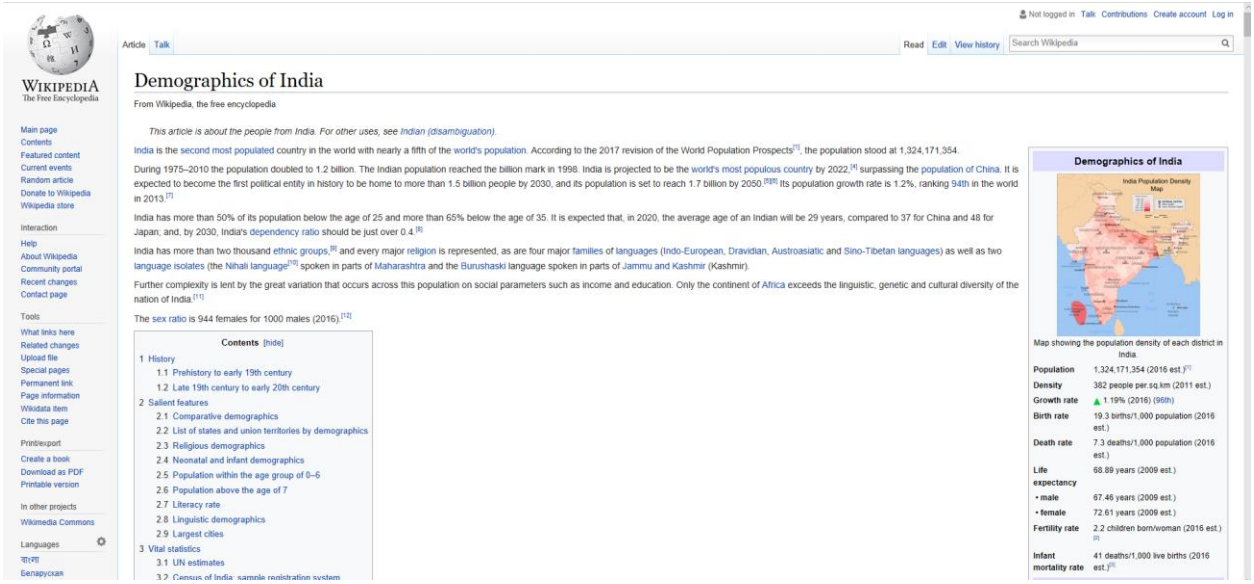
DS4100: Data Science

Creating a Data Frame of the Demographics of India – More Specifically the Population Distribution by States

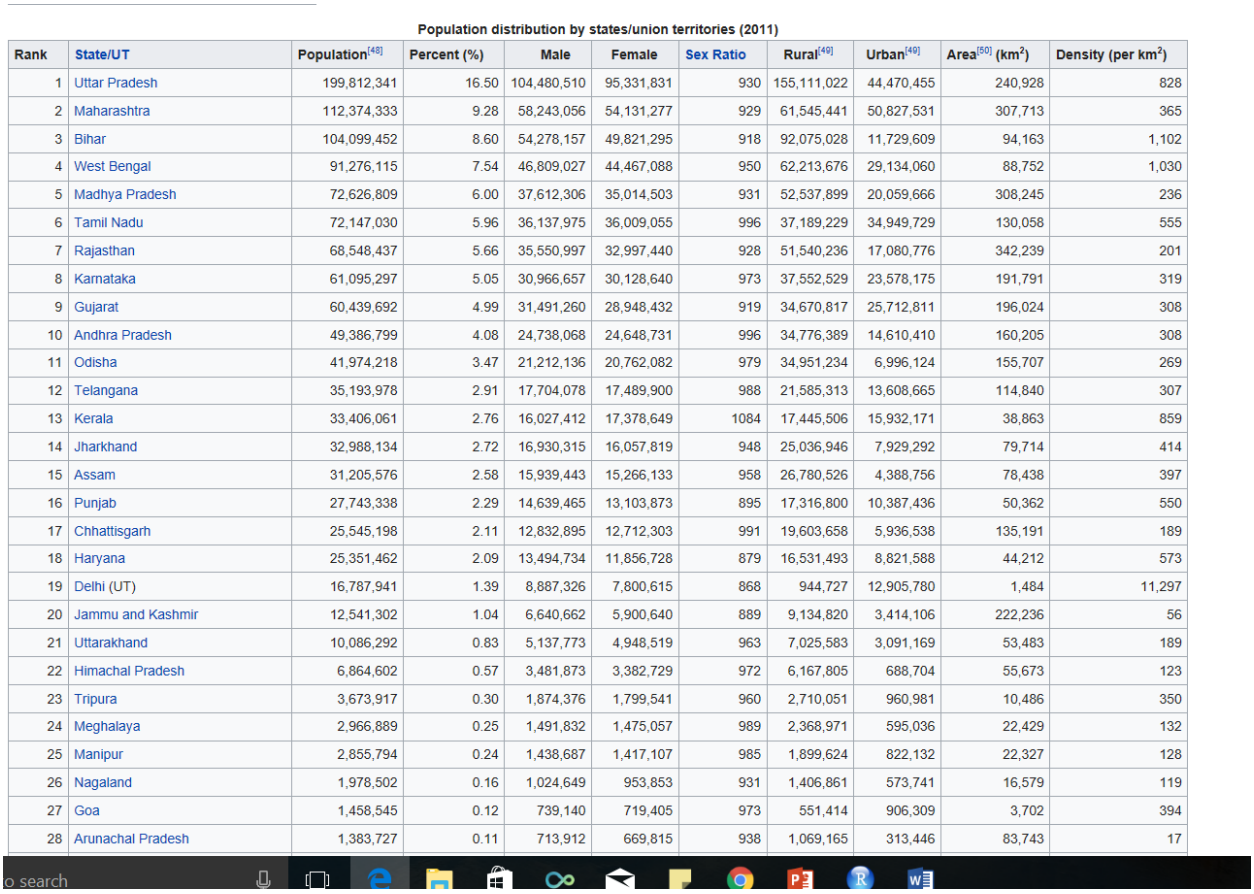
Assignment 7 indicates that I must choose a web scraping toolkit to scrape the data from a website of my choice.

I chose Google Sheets as a web scraping toolkit, with its simple yet powerful ImportHtml() function. With this toolkit, I planned on scraping a Wikipedia page on the Demographics of India. On this page are many tables of useful information, but the one I chose is labeled "Population Distribution by states/union territories (2011)."

Here is a screenshot of the Wikipedia landing page:



And here is the screenshot for the table that is of my interest:



Population distribution by states/union territories (2011)

Rank	State/UT	Population[48]	Percent (%)	Male	Female	Sex Ratio	Rural[49]	Urban[49]	Area[50] (km²)	Density (per km²)
1	Uttar Pradesh	199,812,341	16.50	104,480,510	95,331,831	930	155,111,022	44,470,455	240,928	828
2	Maharashtra	112,374,333	9.28	58,243,056	54,131,277	929	61,545,441	50,827,531	307,713	365
3	Bihar	104,099,452	8.60	54,278,157	49,821,295	918	92,075,028	11,729,609	94,163	1,102
4	West Bengal	91,276,115	7.54	46,809,027	44,467,088	950	62,213,676	29,134,060	88,752	1,030
5	Madhya Pradesh	72,626,809	6.00	37,612,306	35,014,503	931	52,537,899	20,059,666	308,245	236
6	Tamil Nadu	72,147,030	5.96	36,137,975	36,009,055	996	37,189,229	34,949,729	130,058	555
7	Rajasthan	68,548,437	5.66	35,550,997	32,997,440	928	51,540,236	17,080,776	342,239	201
8	Karnataka	61,095,297	5.05	30,966,657	30,128,640	973	37,552,529	23,578,175	191,791	319
9	Gujarat	60,439,692	4.99	31,491,260	28,948,432	919	34,670,817	25,712,811	196,024	308
10	Andhra Pradesh	49,386,799	4.08	24,738,068	24,648,731	996	34,776,389	14,610,410	160,205	308
11	Odisha	41,974,218	3.47	21,212,136	20,762,082	979	34,951,234	6,996,124	155,707	269
12	Telangana	35,193,978	2.91	17,704,078	17,489,900	988	21,585,313	13,608,665	114,840	307
13	Kerala	33,406,061	2.76	16,027,412	17,378,649	1084	17,445,506	15,932,171	38,863	859
14	Jharkhand	32,988,134	2.72	16,930,315	16,057,819	948	25,036,946	7,929,292	79,714	414
15	Assam	31,205,576	2.58	15,939,443	15,266,133	958	26,780,526	4,388,756	78,438	397
16	Punjab	27,743,338	2.29	14,639,465	13,103,873	895	17,316,800	10,387,436	50,362	550
17	Chhattisgarh	25,545,198	2.11	12,832,895	12,712,303	991	19,603,658	5,936,538	135,191	189
18	Haryana	25,351,462	2.09	13,494,734	11,856,728	879	16,531,493	8,821,588	44,212	573
19	Delhi (UT)	16,787,941	1.39	8,887,326	7,800,615	868	944,727	12,905,780	1,484	11,297
20	Jammu and Kashmir	12,541,302	1.04	6,640,662	5,900,640	889	9,134,820	3,414,106	222,236	56
21	Uttarakhand	10,086,292	0.83	5,137,773	4,948,519	963	7,025,583	3,091,169	53,483	189
22	Himachal Pradesh	6,864,602	0.57	3,481,873	3,382,729	972	6,167,805	688,704	55,673	123
23	Tripura	3,673,917	0.30	1,874,376	1,799,541	960	2,710,051	960,981	10,486	350
24	Meghalaya	2,966,889	0.25	1,491,832	1,475,057	989	2,368,971	595,036	22,429	132
25	Manipur	2,855,794	0.24	1,438,687	1,417,107	985	1,899,624	822,132	22,327	128
26	Nagaland	1,978,502	0.16	1,024,649	953,853	931	1,406,861	573,741	16,579	119
27	Goa	1,458,545	0.12	739,140	719,405	973	551,414	906,309	3,702	394
28	Arunachal Pradesh	1,383,727	0.11	713,912	669,815	938	1,069,165	313,446	83,743	17

As you can see, there is much information in this table and plenty of variables that I can (possibly in the future) analyze.

The column names include:

- State/Territory
- Population
- Percent population compared to the country as a whole
- Number of Males
- Number of Females
- Sex Ratio
- Population living in Urban Areas
- Population living in Rural Areas
- Area per square kilometer
- Density per square kilometer

When using the Google Sheets web scraping toolkit, I used the ImportHtml() function.

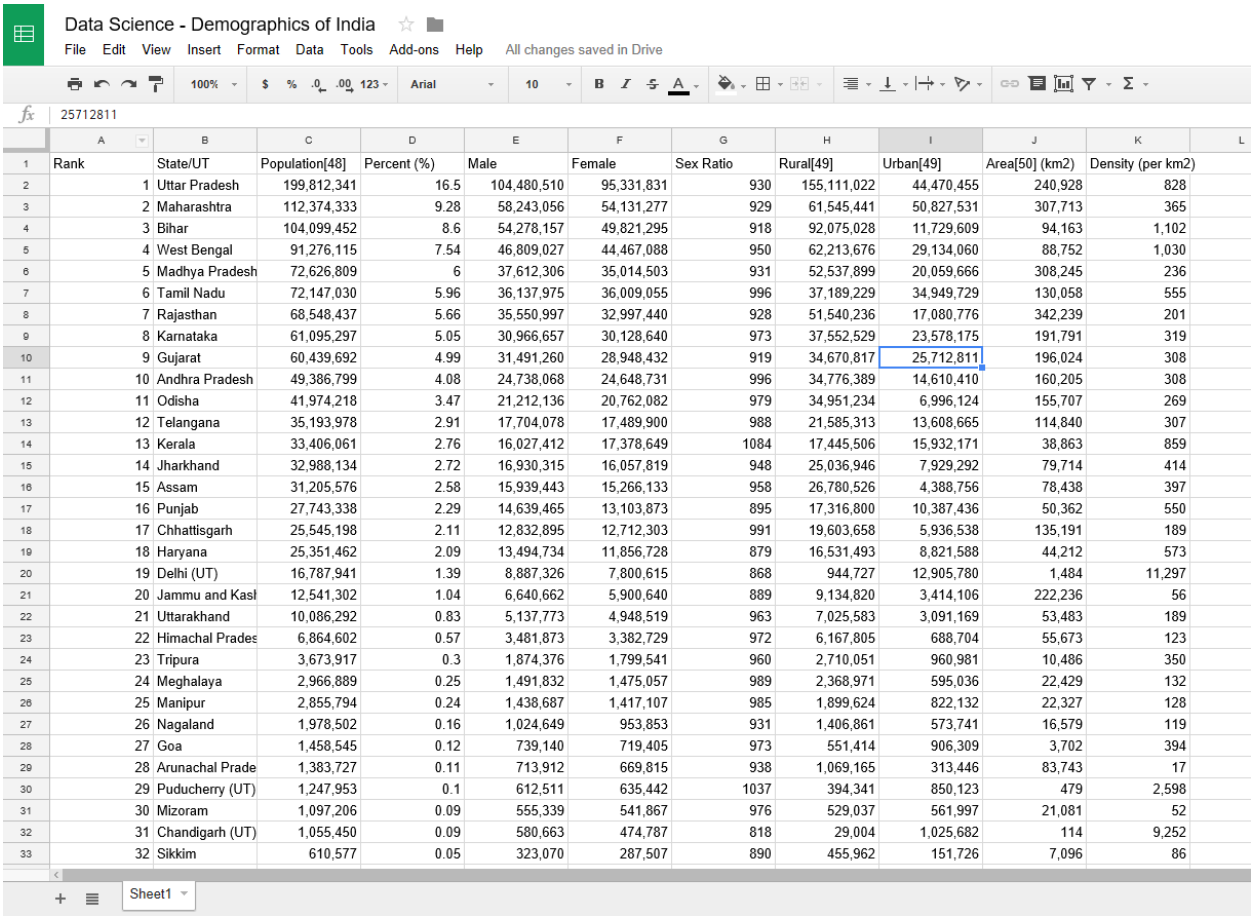
To use it, I needed to enter some information into the function in the top left-hand corner of the cells, so in cell A1:

1. URL of the page you would like to be scraped in quotes
2. Query which can either be a table or list in quotes
3. Index of the table you would like to be scraped as an integer

So, in this case, I typed:

```
=IMPORTHTML("https://en.wikipedia.org/wiki/Demographics_of_India","table",6)
```

And received this as a result:



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16	Punjab	27,743,338	2.29	14,639,465	13,103,873	895	17,316,800	10,387,436	50,362	550
17	Chhattisgarh	25,545,198	2.11	12,832,895	12,712,303	991	19,603,658	5,936,538	135,191	189
18	Haryana	25,351,462	2.09	13,494,734	11,856,728	879	16,531,493	8,821,588	44,212	573
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21	Uttarakhand	10,086,292	0.83	5,137,773	4,948,519	963	7,025,583	3,091,169	53,483	189
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23	Tripura	3,673,917	0.3	1,874,376	1,799,541	960	2,710,051	960,981	10,486	350
24	Meghalaya	2,966,889	0.25	1,491,832	1,475,057	989	2,368,971	595,036	22,429	132
25	Manipur	2,855,794	0.24	1,438,687	1,417,107	985	1,899,624	822,132	22,327	128
26	Nagaland	1,978,502	0.16	1,024,649	953,853	931	1,406,861	573,741	16,579	119
27	Goa	1,458,545	0.12	739,140	719,405	973	551,414	906,309	3,702	394
28	Arunachal Prade	1,383,727	0.11	713,912	669,815	938	1,069,165	313,446	83,743	17
29	Puducherry (UT)	1,247,953	0.1	612,511	635,442	1037	394,341	850,123	479	2,598
30	Mizoram	1,097,206	0.09	555,339	541,867	976	529,037	561,997	21,081	52
31	Chandigarh (UT)	1,055,450	0.09	580,663	474,787	818	29,004	1,025,682	114	9,252
32	Sikkim	610,577	0.05	323,070	287,507	890	455,962	151,726	7,096	86
33	Andaman and Ni	380,581	0.03	202,871	177,710	876	244,411	135,533	8,249	46
34	Dadra and Nagar	343,709	0.03	193,760	149,949	774	183,024	159,829	491	698
35	Daman and Diu (	243,247	0.02	150,301	92,946	618	60,331	182,580	112	2,169
36	Lakshadweep (U	64,473	0.01	33,123	31,350	946	14,121	50,308	32	2,013
–	Total (India)	1,210,854,977	100	623,724,248	586,469,174	943	833,087,662	377,105,760	3,287,240	382

Now that I had received my data, my new goal was to transfer it to a data frame. To do that, I had to download this data as a .csv file.

Next step was to open it in RStudio and work my magic.

First, I had to set the working directory into the place where I had saved the .csv file:

```
Set the working directory
```{r}
setwd("D:/Mahitha/DataScience/HW7/")
```
```

Next, I had to convert this .csv file into a data frame:

```
Convert the downloaded csv file into a dataframe
```{r}
loadDF <- function() {
  if(!exists("demographics")) {
    demographics <- read.csv("Data Science - Demographics of India - Sheet1.csv", header = TRUE)
  }
}
```
```

And just to prove that demographics is indeed a data frame:

```
To show that this is in fact a dataframe, we can call its class type:
```{r}
class(demographics)
```
```

```
[1] "data.frame"
```

Also, I can print out its values and show that all of its data is present from the .csv file:

```
To show that this is a dataframe, I can also print it out and show it to you:
```{r}
print(demographics)
```
```

Rank <fctr>	State.UT <fctr>	Population.48. <fctr>	Percent.... <dbl>	Male <fctr>	Female <fctr>
1	Uttar Pradesh	199,812,341	16.50	104,480,510	95,331,831
2	Maharashtra	112,374,333	9.28	58,243,056	54,131,277
3	Bihar	104,099,452	8.60	54,278,157	49,821,295
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5	Madhya Pradesh	72,626,809	6.00	37,612,306	35,014,503
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8	Karnataka	61,095,297	5.05	30,966,657	30,128,640
9	Gujarat	60,439,692	4.99	31,491,260	28,948,432
10	Andhra Pradesh	49,386,799	4.08	24,738,068	24,648,731

1-10 of 37 rows | 1-6 of 11 columns Previous 1 2 3 4 Next

There are 4 pages of data, and going through each of them will prove that I have successfully created a data frame from a URL.

As you can see, this data looks very clean, and the only thing I would personally do to clean this data is to remove the "Rank" row which is at the far left. Although it may have some symbolic meaning - the order of states by population from greatest to least - it is not necessary to have a separate row to show that. It can quite simply be written as a remark and also can be very easily seen by someone analyzing this data.