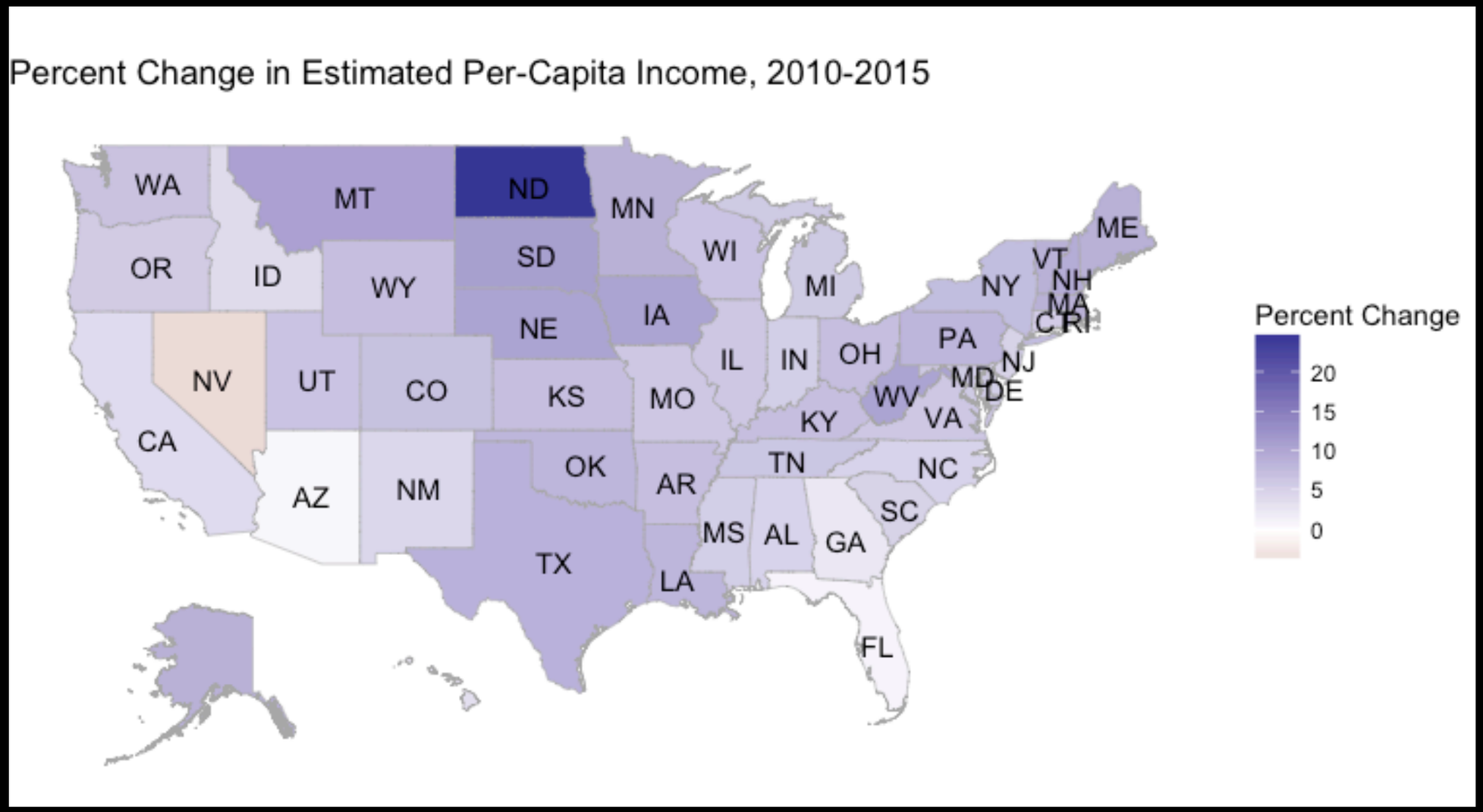


Variables and Vintages

Ari Lamstein

Course Outline

1. Introduction
2. Choroplethr Basics
3. Variables and Vintages
4. Data Details
5. Learning More

Variables and Vintages

- More variables
- More years
- Calculating percent change
- Mapping percent change

df_state_demographics

Filter

	region	total_population	percent_white	percent_black	percent_asian	percent_hispanic	per_capita_income	median_rent	median_age
1	alabama	4799277	67	26	1	4	23680	501	38.1
2	alaska	720316	63	3	5	6	32651	978	33.6
3	arizona	6479703	57	4	3	30	25358	747	36.3
4	arkansas	2933369	74	15	1	7	22170	480	37.5
5	california	37659181	40	6	13	38	29527	1119	35.4
6	colorado	5119329	70	4	3	21	31109	825	36.1
7	connecticut	3583561	70	9	4	14	37892	880	40.2
8	delaware	908446	65	21	3	8	29819	828	38.9
9	district of columbia	619371	35	49	3	10	45290	1154	33.8
10	florida	19091156	57	15	2	23	26236	838	41.0
11	georgia	9810417	55	30	3	9	25182	673	35.6
12	hawaii	1376298	23	2	37	9	29305	1220	38.3
13	idaho	1583364	84	1	1	11	22568	607	34.9
14	illinois	12848554	63	14	5	16	29666	759	36.8
15	indiana	6514861	81	9	2	6	24635	577	37.1
16	iowa	3062553	88	3	2	5	27027	534	38.1
17	kansas	2868107	78	6	2	11	26929	551	36.0
18	kentucky	4361333	86	8	1	3	23462	506	38.2
19	louisiana	4567968	60	32	2	4	24442	610	36.0
20	maine	1328320	94	1	1	1	26824	664	43.2
21	maryland	5834299	54	29	6	8	36354	1034	38.0
22	massachusetts	6605058	76	6	6	10	35763	936	39.2
23	michigan	9886095	76	14	3	5	25681	623	39.1
24	minnesota	5347740	83	5	4	5	30913	734	37.6
25	mississippi	2976872	58	37	1	3	20618	510	36.2
26	missouri	6007182	81	11	2	4	25649	549	38.0
27	montana	998554	87	0	1	3	25373	577	39.9
28	nebraska	1841625	82	4	2	9	26899	563	36.3

R: A data.frame containing demographic statistics for each state... Find in Topic

df_state_demographics {choroplethr} R Documentation

A data.frame containing demographic statistics for each state plus the District of Columbia.

Description

A data.frame containing demographic statistics for each state plus the District of Columbia.

Usage

```
data(df_state_demographics)
```

References

Data comes from the 2013 5-year American Community Survey (ACS). Data generated by ? get_state_demographics.

Examples

?df_state_demographics

df_state_demographics

Filter

	region	total_population	percent_white	percent_black	percent_asian	percent_hispanic	per_capita_income	median_rent	median_age
1	alabama	4799277	67	26	1	4	23680	501	38.1
2	alaska	720316	63	3	5	6	32651	978	33.6
3	arizona	6479703	57	4	3	30	25358	747	36.3
4	arkansas	2933369	74	15	1	7	22170	480	37.5
5	california	37659181	40	6	13	38	29527	1119	35.4
6	colorado	5119329	70	4	3	21	31109	825	36.1
7	connecticut	3583561	70	9	4	14	37892	880	40.2
8	delaware	908446	65	21	3	8	29819	828	38.9
9	district of columbia	619371	35	49	3	10	45290	1154	33.8
10	florida	19091156	57	15	2	23	26236	838	41.0
11	georgia	9810417	55	30	3	9	25182	673	35.6
12	hawaii	1376298	23	2	37	9	29305	1220	38.3
13	idaho	1583364	84	1	1	11	22568	607	34.9
14	illinois	12848554	63	14	5	16	29666	759	36.8
15	indiana	6514861	81	9	2	6	24635	577	37.1
16	iowa	3062553	88	3	2	5	27027	534	38.1
17	kansas	2868107	78	6	2	11	26929	551	36.0
18	kentucky	4361333	86	8	1	3	23462	506	38.2
19	louisiana	4567968	60	32	2	4	24442	610	36.0
20	maine	1328320	94	1	1	1	26824	664	43.2
21	maryland	5834299	54	29	6	8	36354	1034	38.0
22	massachusetts	6605058	76	6	6	10	35763	936	39.2
23	michigan	9886095	76	14	3	5	25681	623	39.1
24	minnesota	5347740	83	5	4	5	30913	734	37.6
25	mississippi	2976872	58	37	1	3	20618	510	36.2

```
data(df_state_demographics)
View(df_state_demographics)
```

df_state_demographics

Filter

	region	total_population	percent_white	percent_black	percent_asian	percent_hispanic	per_capita_income	median_rent	median_age
1	alabama	4799277	67	26	1	4	23680	501	38.1
2	alaska	720316	63	3	5	6	32651	978	33.6
3	arizona	6479703	57	4	3	30	25358	747	36.3
4	arkansas	2933369	74	15	1	7	22170	480	37.5
5	california	37659181	40	6	13	38	29527	1119	35.4
6	colorado	5119329	70	4	3	21	31109	825	36.1
7	connecticut	3583561	70	9	4	14	37892	880	40.2
8	delaware	908446	65	21	3	8	29819	828	38.9
9	district of columbia	619371	35	49	3	10	45290	1154	33.8
10	florida	19091156	57	15	2	23	26236	838	41.0
11	georgia	9810417	55	30	3	9	25182	673	35.6
12	hawaii	1376298	23	2	37	9	29305	1220	38.3
13	idaho	1583364	84	1	1	11	22568	607	34.9
14	illinois	12848554	63	14	5	16	29666	759	36.8
15	indiana	6514861	81	9	2	6	24635	577	37.1
16	iowa	3062553	88	3	2	5	27027	534	38.1
17	kansas	2868107	78	6	2	11	26929	551	36.0
18	kentucky	4361333	86	8	1	3	23462	506	38.2
19	louisiana	4567968	60	32	2	4	24442	610	36.0
20	maine	1328320	94	1	1	1	26824	664	43.2
21	maryland	5834299	54	29	6	8	36354	1034	38.0
22	massachusetts	6605058	76	6	6	10	35763	936	39.2
23	michigan	9886095	76	14	3	5	25681	623	39.1
24	minnesota	5347740	83	5	4	5	30913	734	37.6
25	mississippi	2976872	58	37	1	3	20618	510	36.2

How to map?

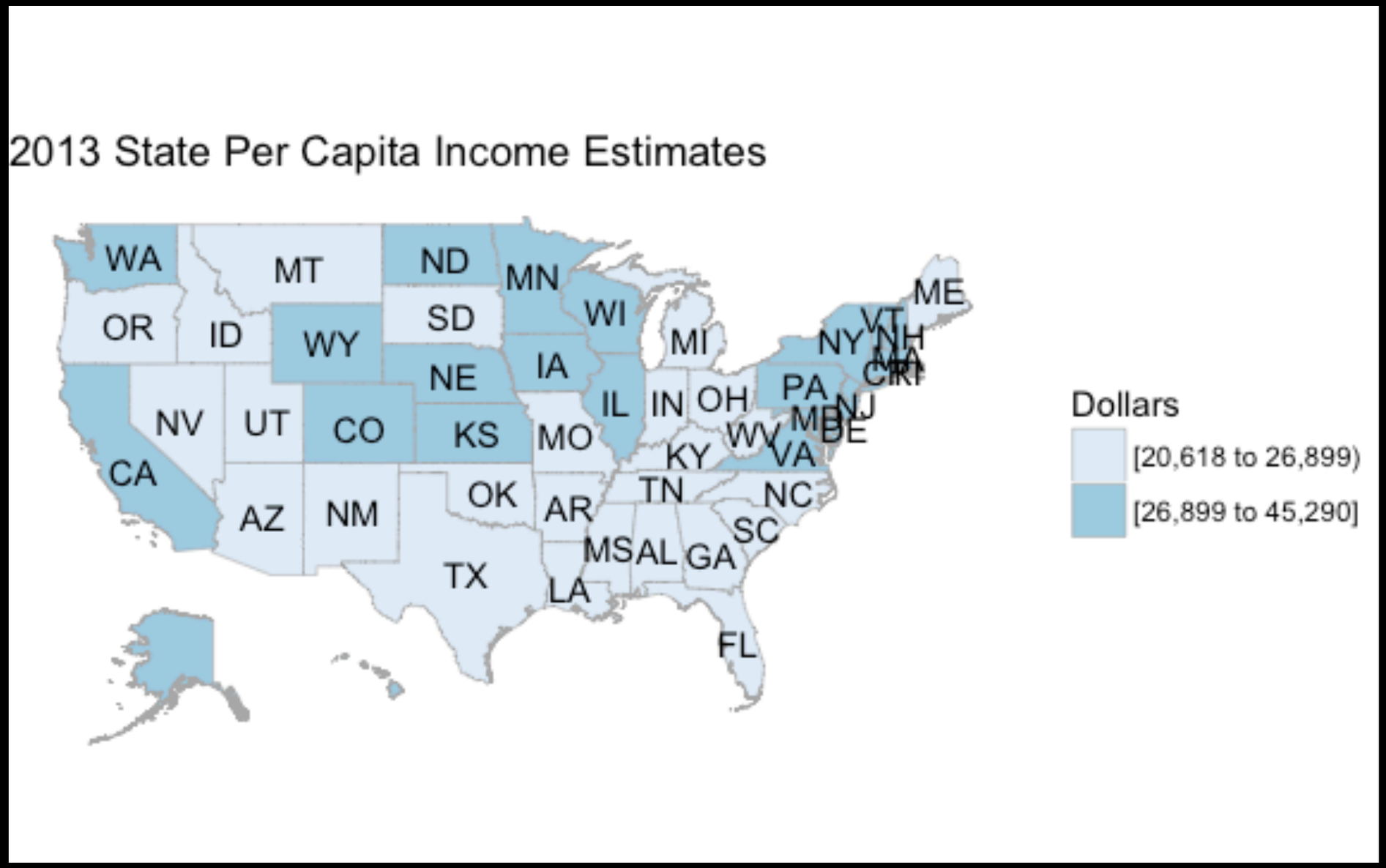
```
df_state_demographics$value =
  df_state_demographics$per_capita_income
```

df_state_demographics × module-3.R ×

Filter

	region	total_population	percent_white	percent_black	percent_asian	percent_hispanic	per_capita_income	median_rent	median_age	value
1	alabama	4799277	67	26	1	4	23680	501	38.1	23680
2	alaska	720316	63	3	5	6	32651	978	33.6	32651
3	arizona	6479703	57	4	3	30	25358	747	36.3	25358
4	arkansas	2933369	74	15	1	7	22170	480	37.5	22170
5	california	37659181	40	6	13	38	29527	1119	35.4	29527
6	colorado	5119329	70	4	3	21	31109	825	36.1	31109
7	connecticut	3583561	70	9	4	14	37892	880	40.2	37892
8	delaware	908446	65	21	3	8	29819	828	38.9	29819
9	district of columbia	619371	35	49	3	10	45290	1154	33.8	45290
10	florida	19091156	57	15	2	23	26236	838	41.0	26236
11	georgia	9810417	55	30	3	9	25182	673	35.6	25182
12	hawaii	1376298	23	2	37	9	29305	1220	38.3	29305
13	idaho	1583364	84	1	1	11	22568	607	34.9	22568
14	illinois	12848554	63	14	5	16	29666	759	36.8	29666
15	indiana	6514861	81	9	2	6	24635	577	37.1	24635
16	iowa	3062553	88	3	2	5	27027	534	38.1	27027
17	kansas	2868107	78	6	2	11	26929	551	36.0	26929
18	kentucky	4361333	86	8	1	3	23462	506	38.2	23462
19	louisiana	4567968	60	32	2	4	24442	610	36.0	24442
20	maine	1328320	94	1	1	1	26824	664	43.2	26824
21	maryland	5834299	54	29	6	8	36354	1034	38.0	36354
22	massachusetts	6605058	76	6	6	10	35763	936	39.2	35763
23	michigan	9886095	76	14	3	5	25681	623	39.1	25681
24	minnesota	5347740	83	5	4	5	30913	734	37.6	30913
25	mississippi	2976872	58	37	1	3	20618	510	36.2	20618
26	missouri	6007182	81	11	2	4	25649	549	38.0	25649
27	montana	998554	87	0	1	3	25373	577	39.9	25373
28	nebraska	1841625	82	4	2	9	26899	563	36.3	26899

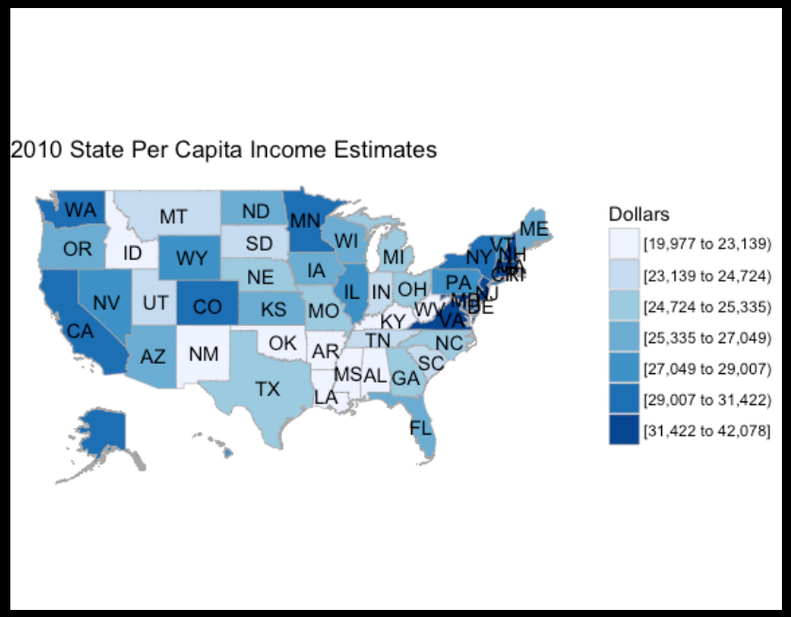
View(df_state_demographics)

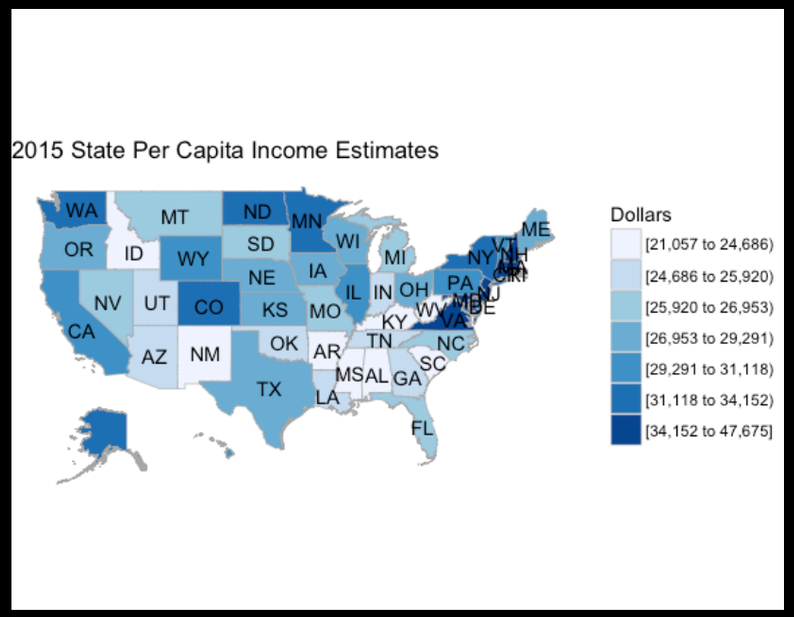



```
state_choropleth(df_state_demographics,
    num_colors = 2,
    title  = "2013 State Per Capita Income Estimates",
    legend = "Dollars")
```

Module Outline

- More variables
- More years
- Calculating percent change
- Mapping percent change





Request A Key

Organization Name:

Email Address:

I agree to the terms of service

Submit Key Request

https://api.census.gov/data/key_signup.html

API Keys

```
api.key.install("<your key here>")
```

Set your key

Only need to do this once

Files Plots Packages Help Viewer

R: Get a handful of demographic variables on US States from the... Find in Topic

get_state_demographics {choroplethr} R Documentation

Get a handful of demographic variables on US States from the US Census Bureau as a data.frame.

Description

The data comes from the American Community Survey (ACS). The variables are: total population, percent White not Hispanic, Percent Black or African American not Hispanic, percent Asian not Hispanic, percent Hispanic all races, per-capita income, median rent and median age.

Usage

```
get_state_demographics(endyear = 2013, span = 5)
```

Arguments

`endyear`	The end year for the survey
`span`	The span of the survey

?get_state_demographics

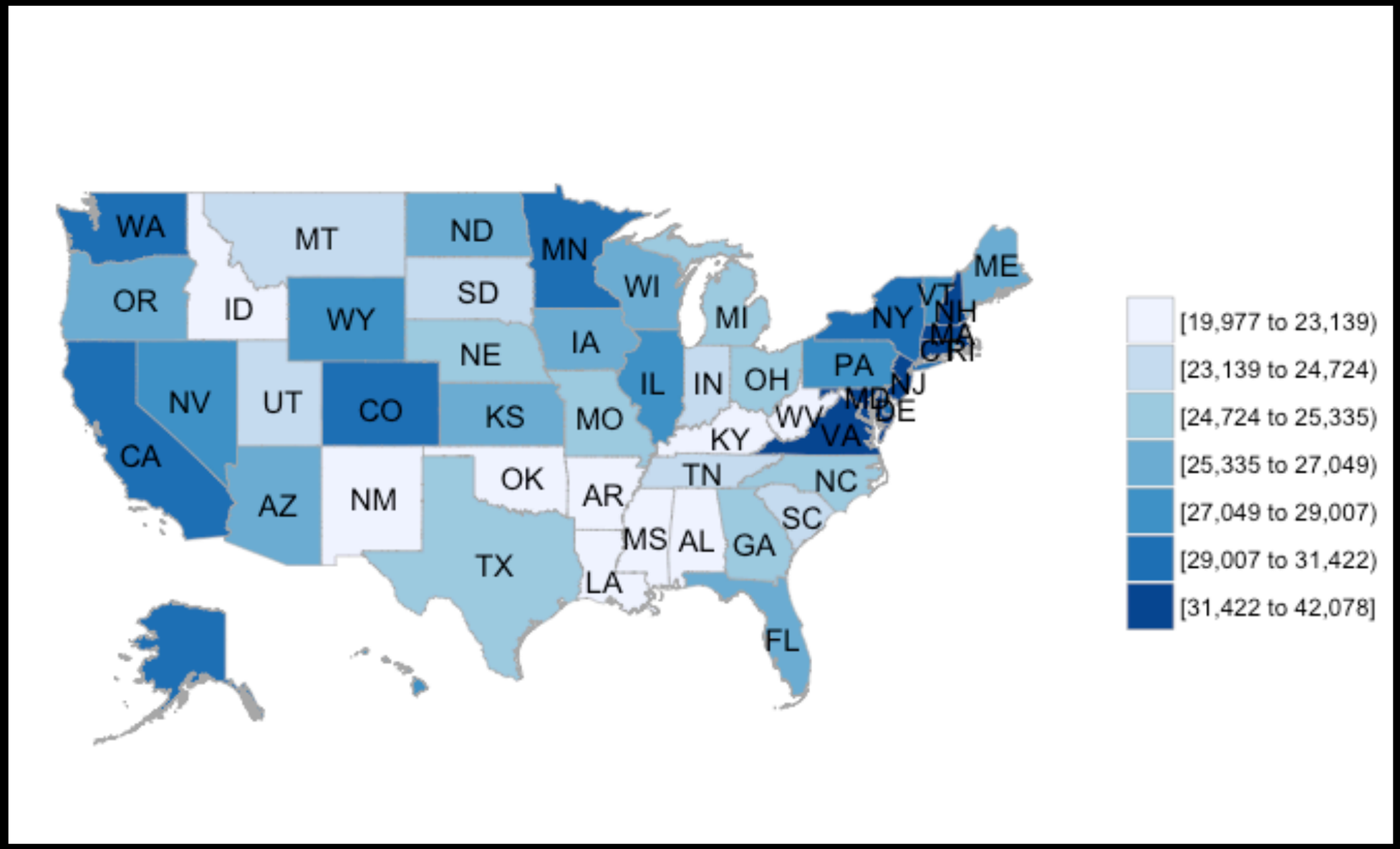
df_2010 × module-3.R ×

Filter

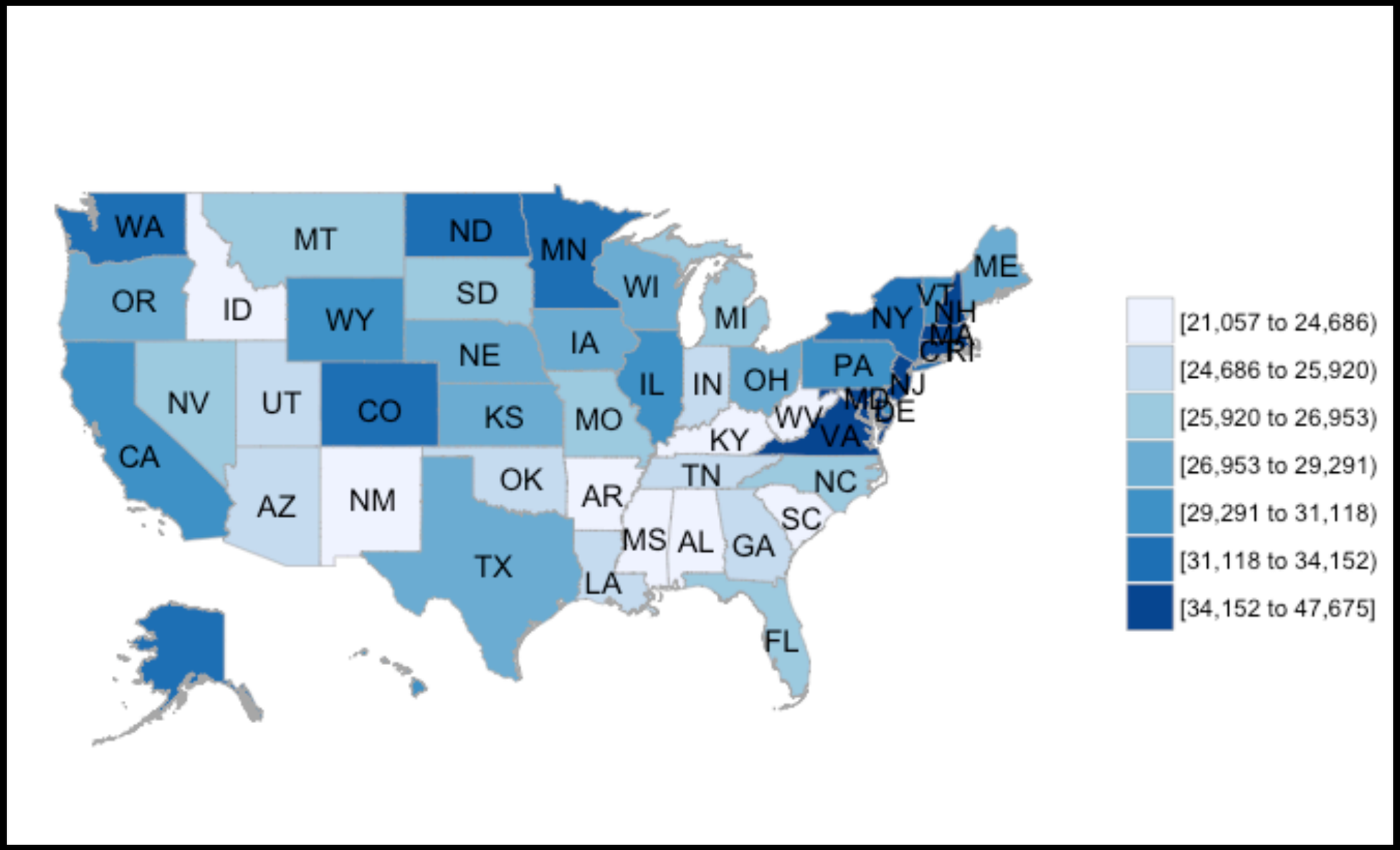
	region	total_population	percent_white	percent_black	percent_asian	percent_hispanic	per_capita_income	median_rent	median_age
1	alabama	4712651	68	26	1	3	22984	452	37.5
2	alaska	691189	64	3	5	6	30726	882	33.8
3	arizona	6246816	59	4	3	29	25680	726	35.5
4	arkansas	2872684	75	15	1	6	21274	442	37.2
5	california	36637290	41	6	13	37	29188	1044	34.9
6	colorado	4887061	71	4	3	20	30151	742	35.8
7	connecticut	3545837	72	9	4	13	36775	821	39.5
8	delaware	881278	66	21	3	8	29007	780	38.3
9	district of columbia	584400	33	52	3	9	42078	971	34.3
10	florida	18511620	59	15	2	22	26551	808	40.3
11	georgia	9468815	57	30	3	8	25134	636	35.0
12	hawaii	1333591	23	1	38	9	28882	1143	38.2
13	idaho	1526797	85	1	1	11	22518	581	34.4
14	illinois	12745359	64	14	4	15	28782	709	36.2
15	indiana	6417398	82	9	1	6	24058	542	36.6
16	iowa	3016267	89	3	2	5	25335	489	38.0
17	kansas	2809329	79	6	2	10	25907	507	36.1
18	kentucky	4285828	87	8	1	3	22515	466	37.7
19	louisiana	4429940	61	32	2	4	23094	540	35.9
20	maine	1327665	95	1	1	1	25385	610	42.0
21	maryland	5696423	56	29	5	8	34849	933	37.6
22	massachusetts	6477096	77	6	5	9	33966	873	38.7
23	michigan	9952687	77	14	2	4	25135	595	38.1
24	minnesota	5241914	84	5	4	4	29582	685	37.1
25	mississippi	2941991	59	37	1	2	19977	454	35.8
26	missouri	5922314	81	11	2	3	24724	511	37.6
27	montana	973739	88	0	1	3	23836	521	39.7
28	nebraska	1799125	83	4	2	8	25229	521	36.2

```
df_2010 = get_state_demographics(2010)
View(df_2010)
```

Does this look familiar?




```
df_2010$value = df_2010$per_capita_income
state_choropleth(df_2010)
```




```
df_2015 = get_state_demographics(2015)
df_2015$value = df_2015$per_capita_income

state_choropleth(df_2015)
```

Module Outline

- More variables
- More years
- Calculating percent change
- Mapping percent change

df_2010 × module-3.R × df_change ×

Filter

	region	value.x	value.y	value
1	alabama	22984	24091	4.82
2	alaska	30726	33413	8.75
3	arizona	25680	25848	0.65
4	arkansas	21274	22798	7.16
5	california	29188	30318	3.87
6	colorado	30151	32217	6.85
7	connecticut	36775	38803	5.51
8	delaware	29007	30554	5.33
9	district of columbia	42078	47675	13.30
10	florida	26551	26829	1.05
11	georgia	25134	25737	2.40
12	hawaii	28882	29822	3.25
13	idaho	22518	23399	3.91
14	illinois	28782	30494	5.95
15	indiana	24058	25346	5.35
16	iowa	25335	27950	10.32
17	kansas	25907	27706	6.94
18	kentucky	22515	24063	6.88
19	louisiana	23094	24981	8.17
20	maine	25385	27655	8.94
21	maryland	34849	36897	5.88
22	massachusetts	33966	36895	8.62
23	michigan	25135	26607	5.86
24	minnesota	29582	32157	8.70
25	mississippi	19977	21057	5.41
26	missouri	24724	26259	6.21
27	montana	23836	26381	10.68
28	nebraska	25229	27882	10.52

Showing 1 to 28 of 51 entries

Files Plots Packages Help Viewer

R: Calculate the percentage change betw Find in Topic

calculate_percent_change {choroplethr} R Documentation

Calculate the percentage change between two choroplethr dataframes.

Description

Merges df1 and df2 on column named "region", and computes percentage change from df1$value to df2$value. Result is in the new "value" column, and rounded to two digits.

Usage

```
calculate_percent_change(df1, df2)
```

Arguments

df1	A dataframe with columns named "region" and "value"
df2	A dataframe with columns named "region" and "value"

Examples

```
# load median age estimates from 2010 and 2015
```

?calculate_percent_change

df_2010 | module-3.R* | df_change

column 0: rownames

Filter

	region	total_population.x	percent_white.x	percent_black.x	percent_asian.x	percent_hispanic.x	per_capita_income.x	median_rent.x	median_age.x	value.x	total_population.y	percent_whit
1	alabama	4712651	68	26	1	3	22984	452	37.5	22984	4830620	
2	alaska	691189	64	3	5	6	30726	882	33.8	30726	733375	
3	arizona	6246816	59	4	3	29	25680	726	35.5	25680	6641928	
4	arkansas	2872684	75	15	1	6	21274	442	37.2	21274	2958208	
5	california	36637290	41	6	13	37	29188	1044	34.9	29188	38421464	
6	colorado	4887061	71	4	3	20	30151	742	35.8	30151	5278906	
7	connecticut	3545837	72	9	4	13	36775	821	39.5	36775	3593222	
8	delaware	881278	66	21	3	8	29007	780	38.3	29007	926454	
9	district of columbia	584400	33	52	3	9	42078	971	34.3	42078	647484	
10	florida	18511620	59	15	2	22	26551	808	40.3	26551	19645772	
11	georgia	9468815	57	30	3	8	25134	636	35.0	25134	10006693	
12	hawaii	1333591	23	1	38	9	28882	1143	38.2	28882	1406299	
13	idaho	1526797	85	1	1	11	22518	581	34.4	22518	1616547	
14	illinois	12745359	64	14	4	15	28782	709	36.2	28782	12873761	
15	indiana	6417398	82	9	1	6	24058	542	36.6	24058	6568645	
16	iowa	3016267	89	3	2	5	25335	489	38.0	25335	3093526	
17	kansas	2809329	79	6	2	10	25907	507	36.1	25907	2892987	
18	kentucky	4285828	87	8	1	3	22515	466	37.7	22515	4397353	
19	louisiana	4429940	61	32	2	4	23094	540	35.9	23094	4625253	
20	maine	1327665	95	1	1	1	25385	610	42.0	25385	1329100	
21	maryland	5696423	56	29	5	8	34849	933	37.6	34849	5930538	
22	massachusetts	6477096	77	6	5	9	33966	873	38.7	33966	6705586	
23	michigan	9952687	77	14	2	4	25135	595	38.1	25135	9900571	
24	minnesota	5241914	84	5	4	4	29582	685	37.1	29582	5419171	
25	mississippi	2941991	59	37	1	2	19977	454	35.8	19977	2988081	
26	missouri	5922314	81	11	2	3	24724	511	37.6	24724	6045448	
27	montana	973739	88	0	1	3	23836	521	39.7	23836	1014699	
28	nebraska	1799125	83	4	2	8	25229	521	36.2	25229	1869365	

Showing 1 to 28 of 51 entries

```
df_change = calculate_percent_change(df_2010, df_2015)

View(df_change)
```

df_2010 × module-3.R × df_change ×

Filter

	region	value.x	value.y	value
1	alabama	22984	24091	4.82
2	alaska	30726	33413	8.75
3	arizona	25680	25848	0.65
4	arkansas	21274	22798	7.16
5	california	29188	30318	3.87
6	colorado	30151	32217	6.85
7	connecticut	36775	38803	5.51
8	delaware	29007	30554	5.33
9	district of columbia	42078	47675	13.30
10	florida	26551	26829	1.05
11	georgia	25134	25737	2.40
12	hawaii	28882	29822	3.25
13	idaho	22518	23399	3.91
14	illinois	28782	30494	5.95
15	indiana	24058	25346	5.35
16	iowa	25335	27950	10.32
17	kansas	25907	27706	6.94
18	kentucky	22515	24063	6.88
19	louisiana	23094	24981	8.17
20	maine	25385	27655	8.94
21	maryland	34849	36897	5.88
22	massachusetts	33966	36895	8.62
23	michigan	25135	26607	5.86
24	minnesota	29582	32157	8.70
25	mississippi	19977	21057	5.41
26	missouri	24724	26259	6.21
27	montana	23836	26381	10.68
28	nebraska	25229	27882	10.52

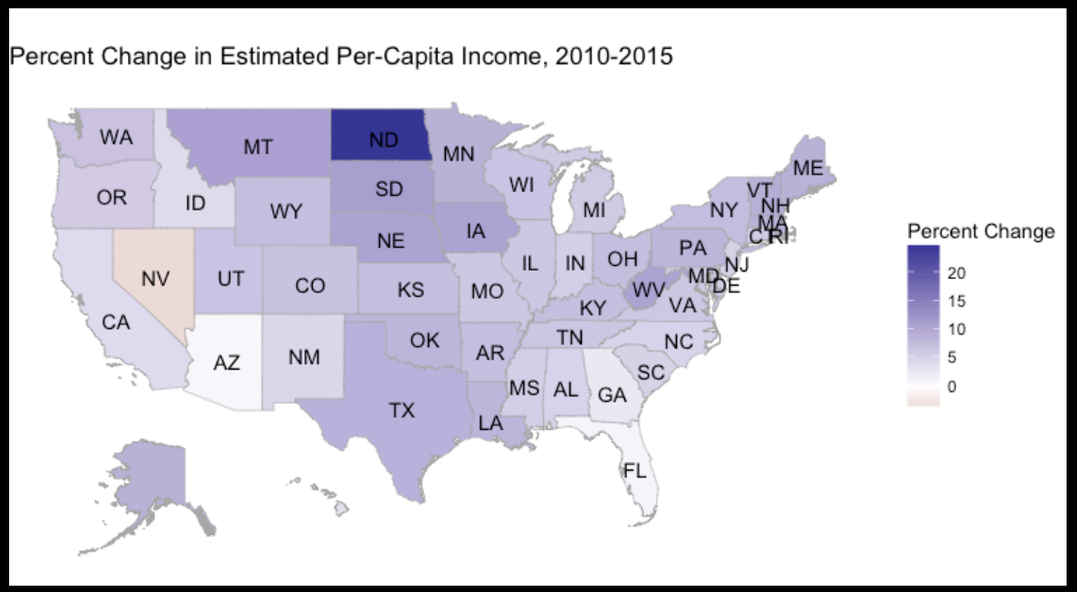
Showing 1 to 28 of 51 entries

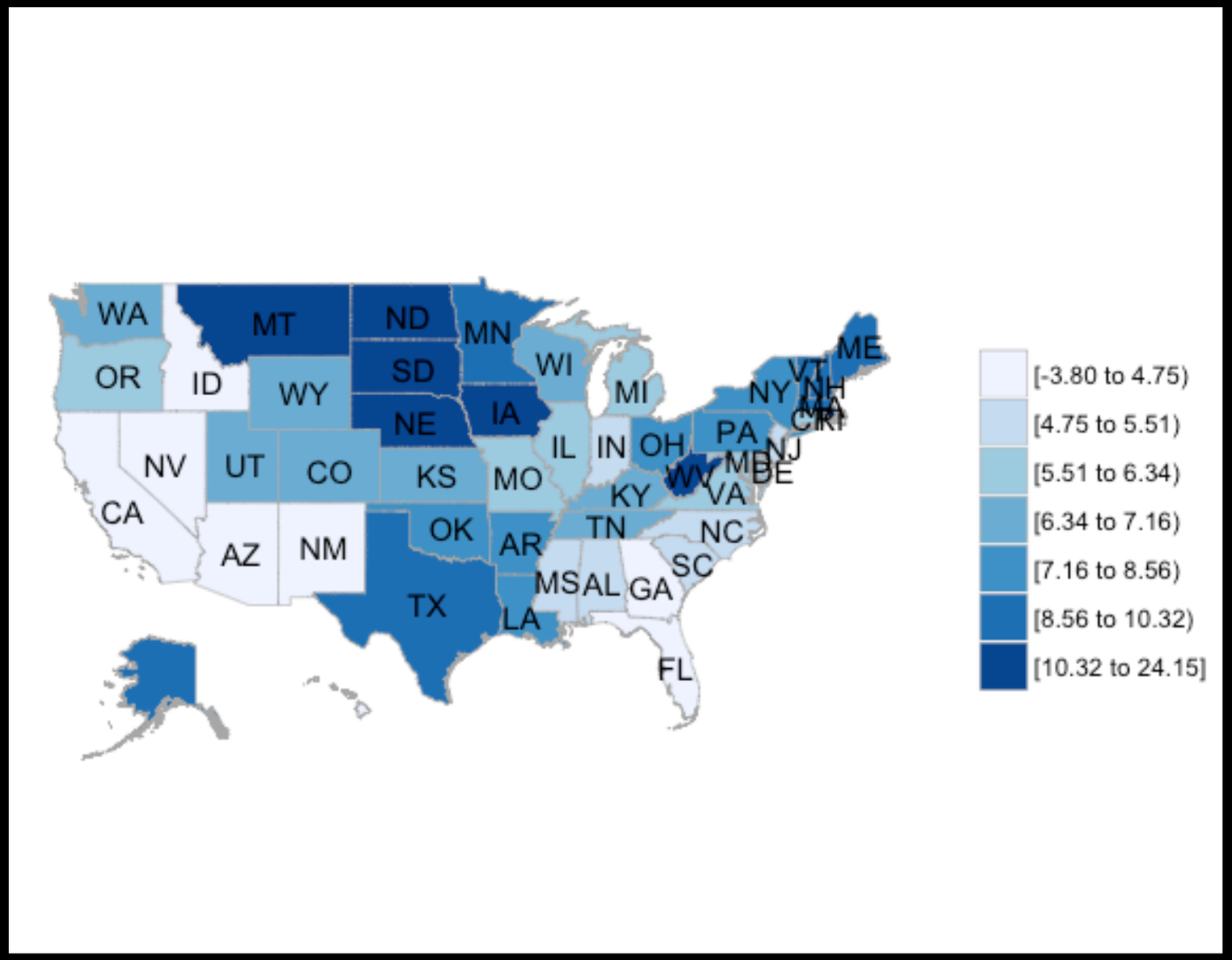
```
df_change = df_change[, c("region", "value.x", "value.y", "value")]

View(df_change)
```

Remove unnecessary columns (optional)

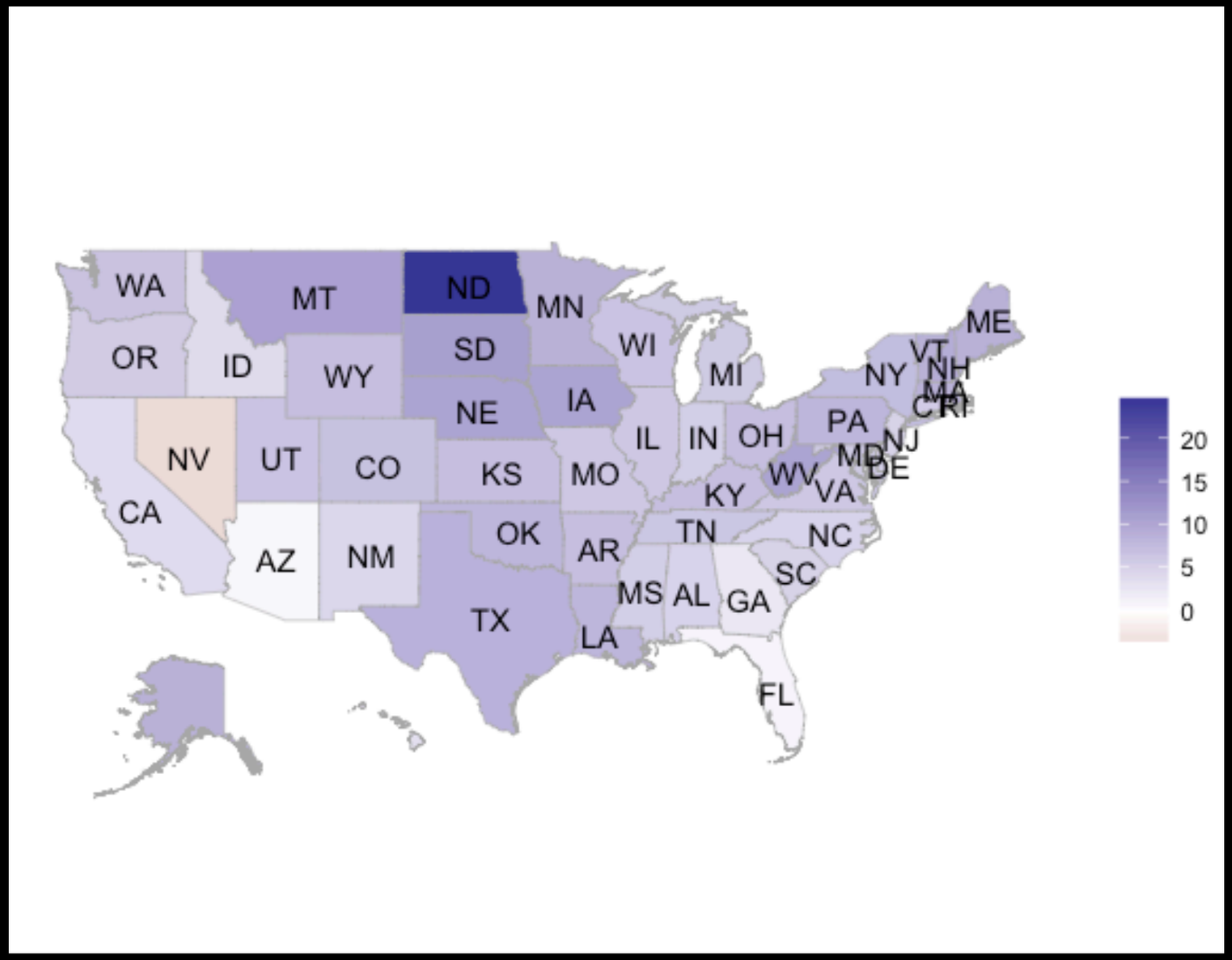
Module Outline

- More variables
- More years
- Calculating percent change
- Mapping percent change

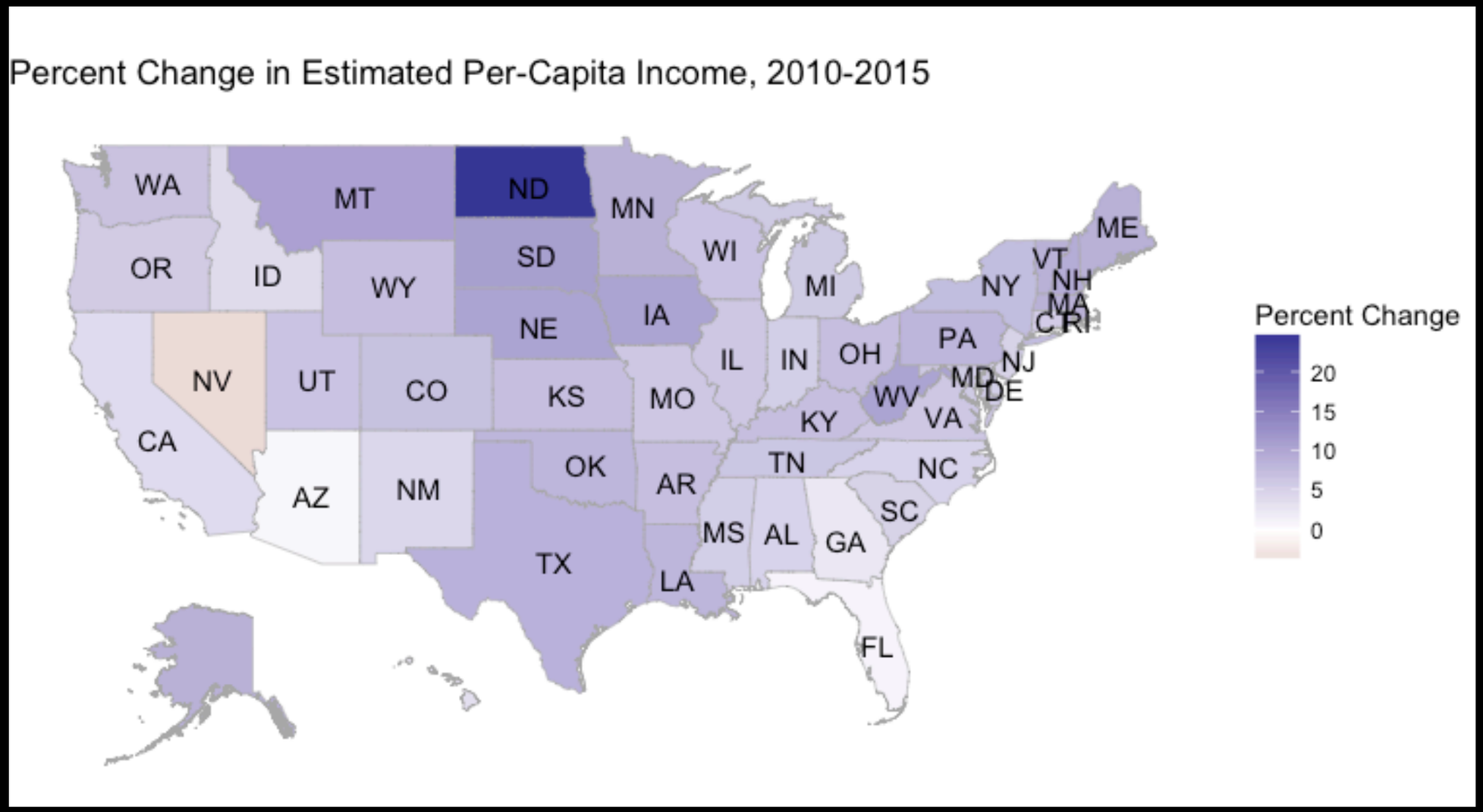




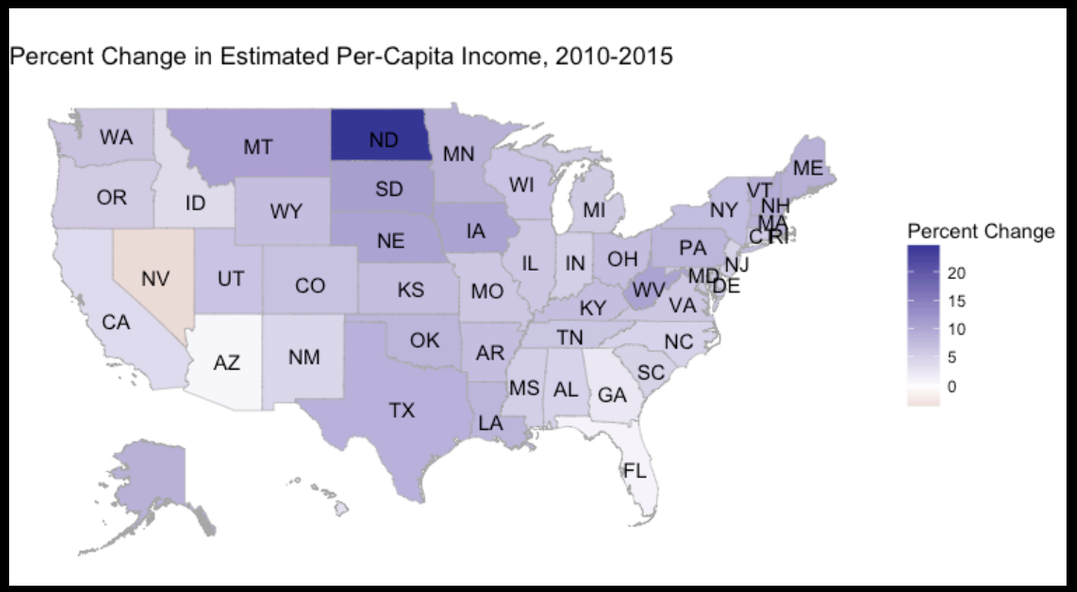
state_choropleth(df_change)



state_choropleth(df_change, num_colors=0)




```
state_choropleth(df_change,
    num_colors=0,
    title = "Percent Change in Estimated Per-Capita Income, 2010-2015”,
    legend=“Percent")
```

Module Outline

- More variables
- More years
- Calculating percent change
- Mapping percent change