Alper Yılmaz - Final Report - CSSM 502

January 19, 2023

- State Capacity as a territorial reach

- Because of the existence of territorial challengers during the state formation process, the state could develop uneven state capacity over the territory.

- Measurement of territorial reach based on the public good provision in the literature.

- The case is the Republic of Turkey.

- I examine three fields; health, education, and justice.

- I collected data from TÜİK

- The variables that I used are the following:

1) the number of hospital beds per 100.000 people,

2) the number of public hospitals per 100.000 people,

3) the number of doctors per 100.000 people,

4) the number of schools per 100.000 5-9 aged people,

5) the number of classes per 100.000 5-9 aged people,

6) the number of crimes per 100.000 people.

[1]:
```
import pandas as pd
import numpy as np
```

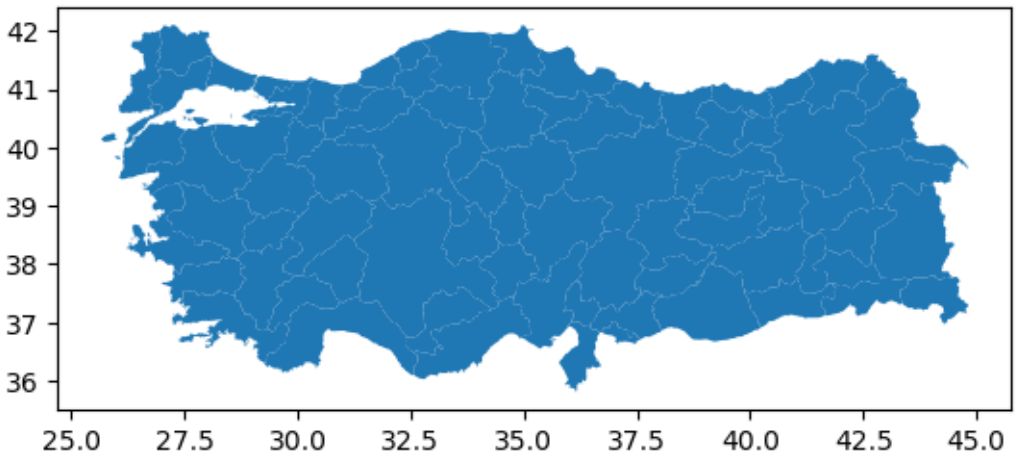
[2]:
```
import geopandas as gpd

shapefile = gpd.read_file("/Users/alperyilmaz/Downloads/
 ↪turkey_administrativelevels0_1_2/tur_polbnda_adm1.shp")
print(shapefile)
```

```
          adm1_tr         adm1_en    adm1  Shape_Leng  Shape_Area adm0_en  \
0           ADANA           ADANA  TUR001    8.271786    1.407083  TURKEY
1         ADIYAMAN        ADIYAMAN  TUR002    5.494422    0.750561  TURKEY
2   AFYONKARAHİSAR  AFYONKARAHISAR  TUR003    7.149996    1.450064  TURKEY
3             AĞRI            AGRI  TUR004    6.588304    1.163170  TURKEY
4          AKSARAY         AKSARAY  TUR068    4.432509    0.790388  TURKEY
```

```
..             ...             ...     ...         ...         ...     ...
76            UŞAK            USAK  TUR064    3.864988    0.574221  TURKEY
77             VAN             VAN  TUR065    8.362708    2.159743  TURKEY
78          YALOVA          YALOVA  TUR077    2.051652    0.087016  TURKEY
79          YOZGAT          YOZGAT  TUR066    6.386410    1.436743  TURKEY
80       ZONGULDAK       ZONGULDAK  TUR067    3.270366    0.360484  TURKEY

    adm0_tr adm0                                               geometry
0   TÜRKİYE  TUR  POLYGON ((36.31587 38.36376, 36.31769 38.36367...
1   TÜRKİYE  TUR  POLYGON ((39.25297 38.18188, 39.25334 38.18159...
2   TÜRKİYE  TUR  POLYGON ((31.14797 39.26246, 31.15825 39.25753...
3   TÜRKİYE  TUR  POLYGON ((43.28706 40.01281, 43.29129 40.00884...
4   TÜRKİYE  TUR  POLYGON ((33.96446 39.03804, 33.96453 39.03723...
..      ...  ...                                                ...
76  TÜRKİYE  TUR  POLYGON ((29.74957 38.92497, 29.75259 38.92385...
77  TÜRKİYE  TUR  POLYGON ((43.86293 39.35519, 43.86625 39.35450...
78  TÜRKİYE  TUR  POLYGON ((29.53290 40.74757, 29.53292 40.73702...
79  TÜRKİYE  TUR  POLYGON ((35.38648 40.24666, 35.38896 40.24665...
80  TÜRKİYE  TUR  POLYGON ((32.12947 41.56021, 32.13194 41.55960...

[81 rows x 9 columns]
```

[3]:
```
shapefile.plot()
```

[3]: <AxesSubplot:>



[4]:
```
data2020 = pd.read_excel('/Users/alperyilmaz/Downloads/tuikstat2020extended.
↪xlsx')

data2020.columns
```

[4]:
```
Index(['Year', 'adm1', 'adm1_en', 'Primary School ', 'Crime',
       'Specialist doctor', 'Population', 'Hospital', 'Hospital_bed',
       'Primary school branch', 'Killing', 'Public hospital', 'Teacher',
       'Public hospital bed', 'Doctor', 'population 5-9', 'Primary School_2',
       'population 10-14', 'bed per 100thou', 'population 15-19',
       'Primary school Class', 'public hospital_100thoupop',
       'doctor_100thoupop', 'primary_5-9_100thou_pop', 'class_100thou_pop',
       'crime_100thou_pop', 'revolts'],
      dtype='object')
```

[5]:
```
merged_data = shapefile.merge(data2020, on='adm1')

merged_data.columns
print(merged_data.head())
merged_data
```

```
          adm1_tr       adm1_en_x    adm1  Shape_Leng  Shape_Area adm0_en  \
0           ADANA           ADANA  TUR001    8.271786    1.407083  TURKEY
1         ADIYAMAN         ADIYAMAN  TUR002    5.494422    0.750561  TURKEY
2  AFYONKARAHİSAR  AFYONKARAHISAR  TUR003    7.149996    1.450064  TURKEY
3            AĞRI            AGRI  TUR004    6.588304    1.163170  TURKEY
4         AKSARAY         AKSARAY  TUR068    4.432509    0.790388  TURKEY

   adm0_tr adm0                                           geometry  Year  ...  \
0  TÜRKİYE  TUR  POLYGON ((36.31587 38.36376, 36.31769 38.36367...  2020  ...
1  TÜRKİYE  TUR  POLYGON ((39.25297 38.18188, 39.25334 38.18159...  2020  ...
2  TÜRKİYE  TUR  POLYGON ((31.14797 39.26246, 31.15825 39.25753...  2020  ...
3  TÜRKİYE  TUR  POLYGON ((43.28706 40.01281, 43.29129 40.00884...  2020  ...
4  TÜRKİYE  TUR  POLYGON ((33.96446 39.03804, 33.96453 39.03723...  2020  ...

  population 10-14  bed per 100thou  population 15-19  Primary school Class  \
0           188746              328            176530                  6817
1            59705              222             57100                  2312
2            55001              314             55200                  3136
3            59065              167             58706                  3482
4            35951              199             33719                  1737

   public hospital_100thoupop  doctor_100thoupop  primary_5-9_100thou_pop  \
0                    0.619821         207.639909               173.643702
1                    1.581130         157.322451               197.587187
2                    2.442625         171.526587               215.214576
3                    1.494112         105.708443               134.380978
4                    1.654803         139.712679               389.094007

   class_100thou_pop  crime_100thou_pop  revolts
0        3554.742090         363.524796        0
1        3713.996562         145.463975        1
2        5719.600941         360.965760        0
```

```
3        5504.877239         229.346233        1
4        4933.257597         350.109099        0

[5 rows x 35 columns]
```

[5]:

	adm1_tr	adm1_en_x	adm1	Shape_Leng	Shape_Area	adm0_en
0	ADANA	ADANA	TUR001	8.271786	1.407083	TURKEY
1	ADIYAMAN	ADIYAMAN	TUR002	5.494422	0.750561	TURKEY
2	AFYONKARAHİSAR	AFYONKARAHISAR	TUR003	7.149996	1.450064	TURKEY
3	AĞRI	AGRI	TUR004	6.588304	1.163170	TURKEY
4	AKSARAY	AKSARAY	TUR068	4.432509	0.790388	TURKEY
..	...	...	...	...	...	...
76	UŞAK	USAK	TUR064	3.864988	0.574221	TURKEY
77	VAN	VAN	TUR065	8.362708	2.159743	TURKEY
78	YALOVA	YALOVA	TUR077	2.051652	0.087016	TURKEY
79	YOZGAT	YOZGAT	TUR066	6.386410	1.436743	TURKEY
80	ZONGULDAK	ZONGULDAK	TUR067	3.270366	0.360484	TURKEY

	adm0_tr	adm0	geometry	Year
0	TÜRKİYE	TUR	POLYGON ((36.31587 38.36376, 36.31769 38.36367...	2020
1	TÜRKİYE	TUR	POLYGON ((39.25297 38.18188, 39.25334 38.18159...	2020
2	TÜRKİYE	TUR	POLYGON ((31.14797 39.26246, 31.15825 39.25753...	2020
3	TÜRKİYE	TUR	POLYGON ((43.28706 40.01281, 43.29129 40.00884...	2020
4	TÜRKİYE	TUR	POLYGON ((33.96446 39.03804, 33.96453 39.03723...	2020
..	...	...	...	...
76	TÜRKİYE	TUR	POLYGON ((29.74957 38.92497, 29.75259 38.92385...	2020
77	TÜRKİYE	TUR	POLYGON ((43.86293 39.35519, 43.86625 39.35450...	2020
78	TÜRKİYE	TUR	POLYGON ((29.53290 40.74757, 29.53292 40.73702...	2020
79	TÜRKİYE	TUR	POLYGON ((35.38648 40.24666, 35.38896 40.24665...	2020
80	TÜRKİYE	TUR	POLYGON ((32.12947 41.56021, 32.13194 41.55960...	2020

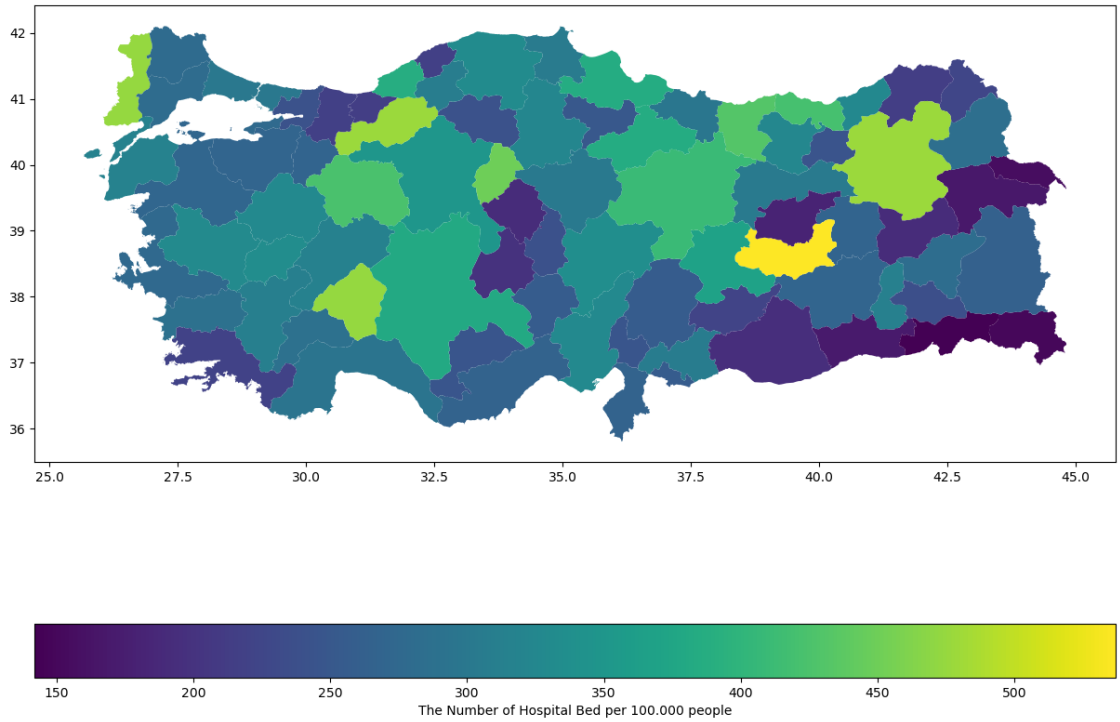
	...	population 10-14	bed per 100thou	population 15-19
0	...	188746	328	176530
1	...	59705	222	57100
2	...	55001	314	55200
3	...	59065	167	58706
4	...	35951	199	33719
..	...	...	...	...
76	...	24012	334	24474
77	...	124786	263	122384
78	...	18690	277	18507
79	...	31370	301	32340
80	...	38707	388	39009

	Primary school Class	public hospital_100thoupop	doctor_100thoupop
0	6817	0.619821	207.639909
1	2312	1.581130	157.322451

```
2                    3136                    2.442625         171.526587
3                    3482                    1.494112         105.708443
4                    1737                    1.654803         139.712679
..                    ...                         ...                ...
76                   1142                    1.624110         148.064737
77                   5592                    0.870063         140.863207
78                    877                    1.449013         159.029161
79                   2137                    3.340531         167.503788
80                   1633                    1.353171         188.090744

    primary_5-9_100thou_pop  class_100thou_pop  crime_100thou_pop  revolts
0                173.643702        3554.742090         363.524796        0
1                197.587187        3713.996562         145.463975        1
2                215.214576        5719.600941         360.965760        0
3                134.380978        5504.877239         229.346233        1
4                389.094007        4933.257597         350.109099        0
..                      ...                ...                ...      ...
76               650.877635        4795.498446         429.306532        0
77                88.548725        4305.777997         201.332589        1
78              1266.905436        4688.084674         290.527078        0
79               425.215265        7572.375182         255.312041        0
80               402.680703        4696.982771         327.467338        0

[81 rows x 35 columns]
```

[12]:
```
from matplotlib import pyplot as plt

merged_data.plot(column='bed per 100thou', legend=True,
                 legend_kwds={'label': "The Number of Hospital Bed per 100.000␣
 ↪people", 'orientation': "horizontal"},
                 figsize=(15, 15))

plt.savefig('The Number of Hospital Bed per 100.000 people.pdf')


merged_data.plot(column='public hospital_100thoupop', legend=True,
                 legend_kwds={'label': "The Number of Public Hospital per 100.000␣
 ↪people", 'orientation': "horizontal"},
                 figsize=(15, 15))

plt.savefig('The Number of Public Hospital per 100.000 people.pdf')

merged_data.plot(column='doctor_100thoupop', legend=True,
                 legend_kwds={'label': "The Number of Doctor per 100.000 people",␣
 ↪'orientation': "horizontal"},
                 figsize=(15, 15))
```

```
plt.savefig('The Number of Doctor per 100.000 people.pdf')

merged_data.plot(column='primary_5-9_100thou_pop', legend=True,
                 legend_kwds={'label': "The Number of School per 100.000 5-9 ages␣
 ↪people", 'orientation': "horizontal"},
                 figsize=(15, 15))

plt.savefig('The Number of School per 100.000 5-9 ages people.pdf')

merged_data.plot(column='class_100thou_pop', legend=True,
                 legend_kwds={'label': "The Number of Class per 100.000 5-9 ages␣
 ↪people", 'orientation': "horizontal"},
                 figsize=(15, 15))

plt.savefig('The Number of Class per 100.000 5-9 ages people.pdf')


merged_data.plot(column='crime_100thou_pop', legend=True,
                 legend_kwds={'label': "The Number of Crime per 100.000 people",␣
 ↪'orientation': "horizontal"},
                 figsize=(15, 15))


plt.savefig('The Number of Crime per 100.000 people.pdf')

merged_data.plot(column='revolts', legend=True,
                 legend_kwds={'label': "The provinces where revolts occurred in␣
 ↪years between 1923-1938", 'orientation': "horizontal"},
                 figsize=(15, 15))

plt.savefig('The provinces where revolts occurred in years between 1923-1938.
 ↪pdf')
```


42
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32.5
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37.5
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42.5
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150
200
250
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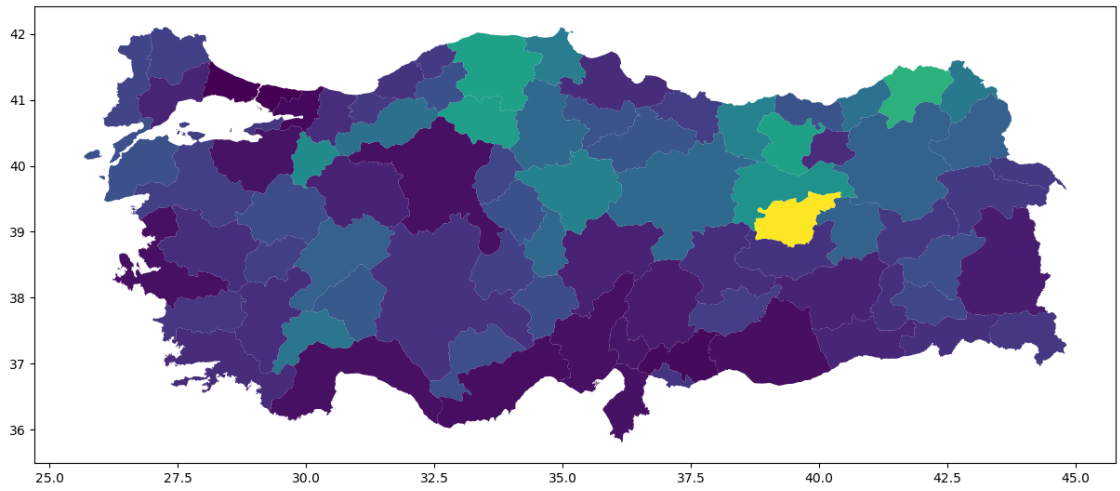
450
500
The Number of Hospital Bed per 100.000 people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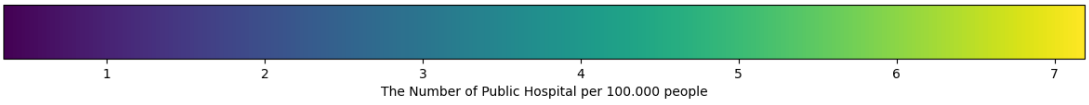
1
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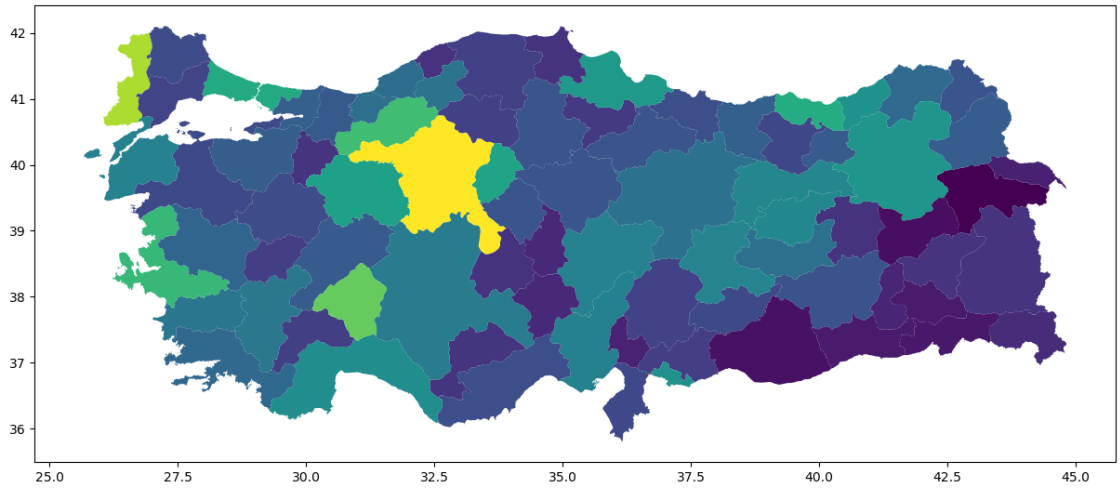
7
The Number of Public Hospital per 100.000 people


42
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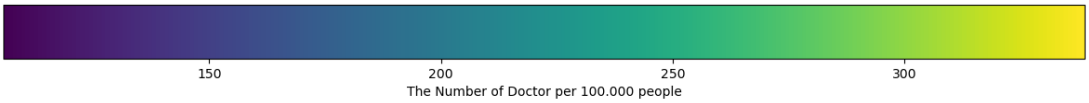
150
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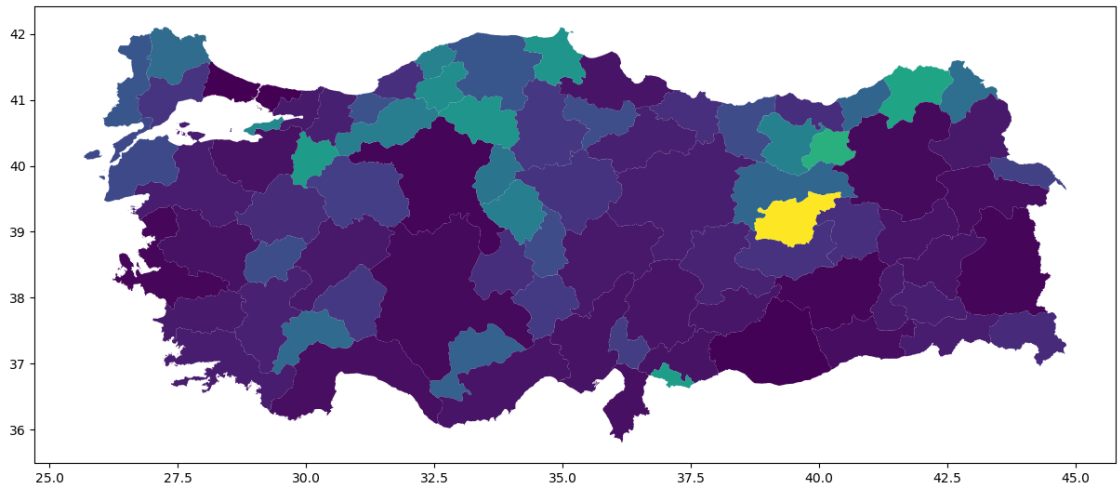
The Number of Doctor per 100.000 people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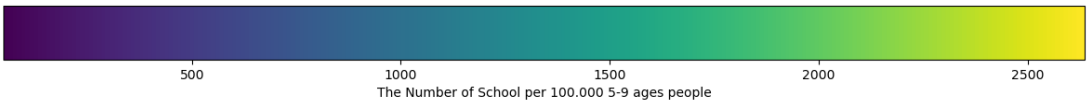
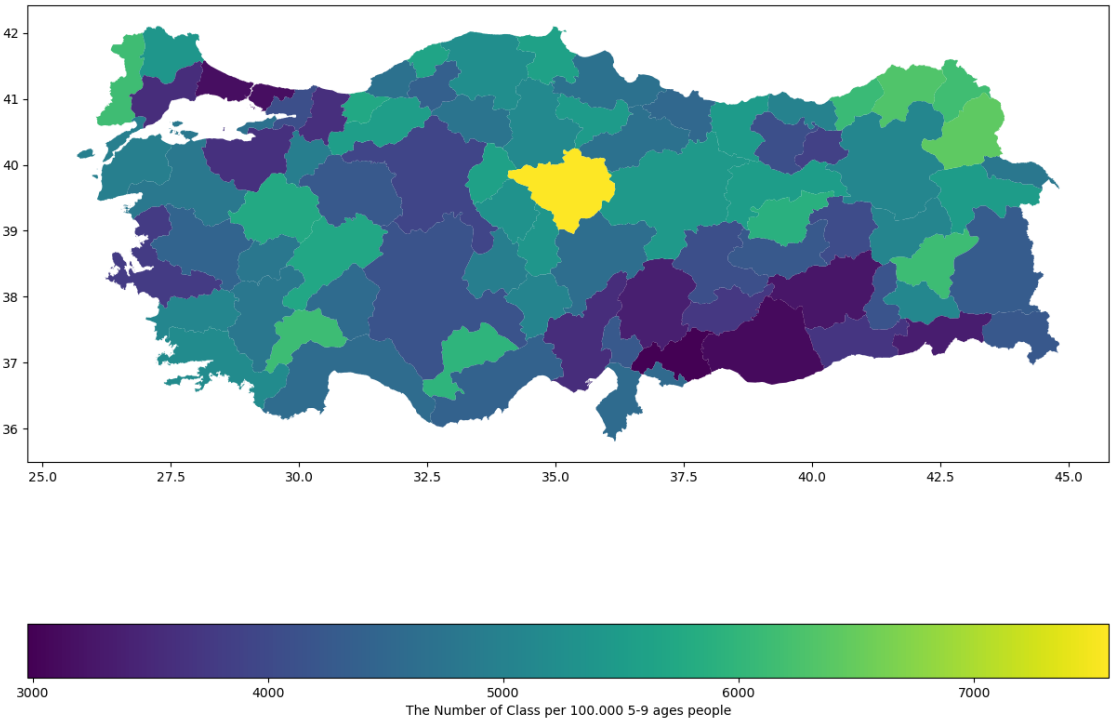

500
1000
1500
2000
2500
The Number of School per 100.000 5-9 ages people


42
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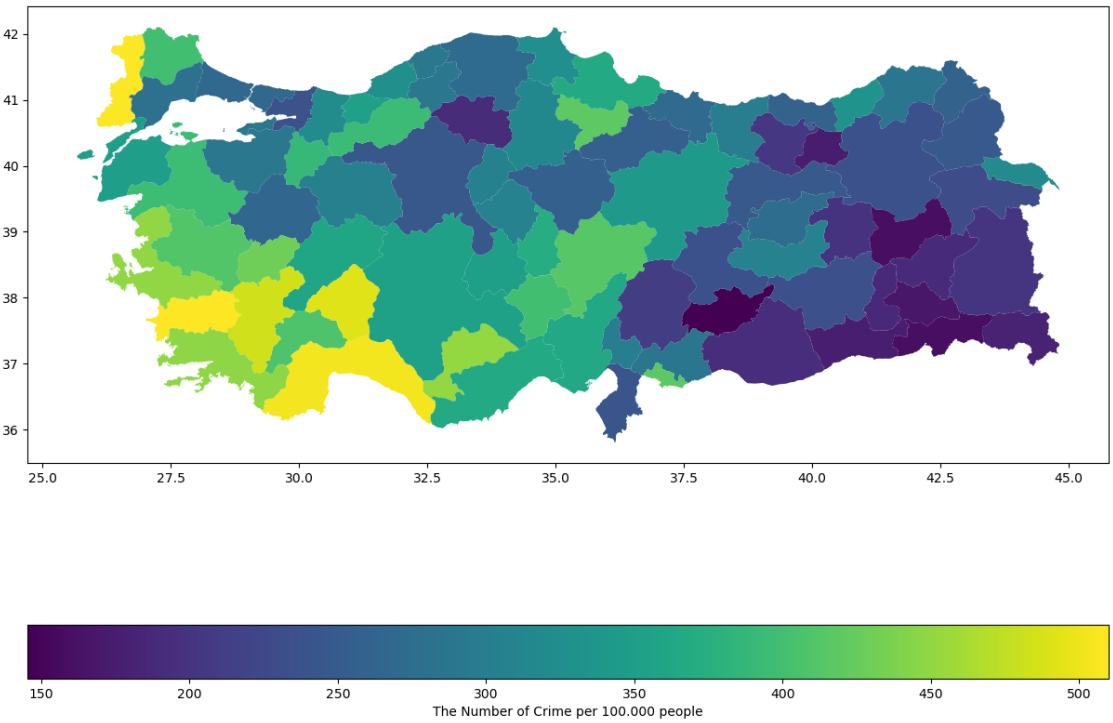
The Number of Class per 100.000 5-9 ages people


42
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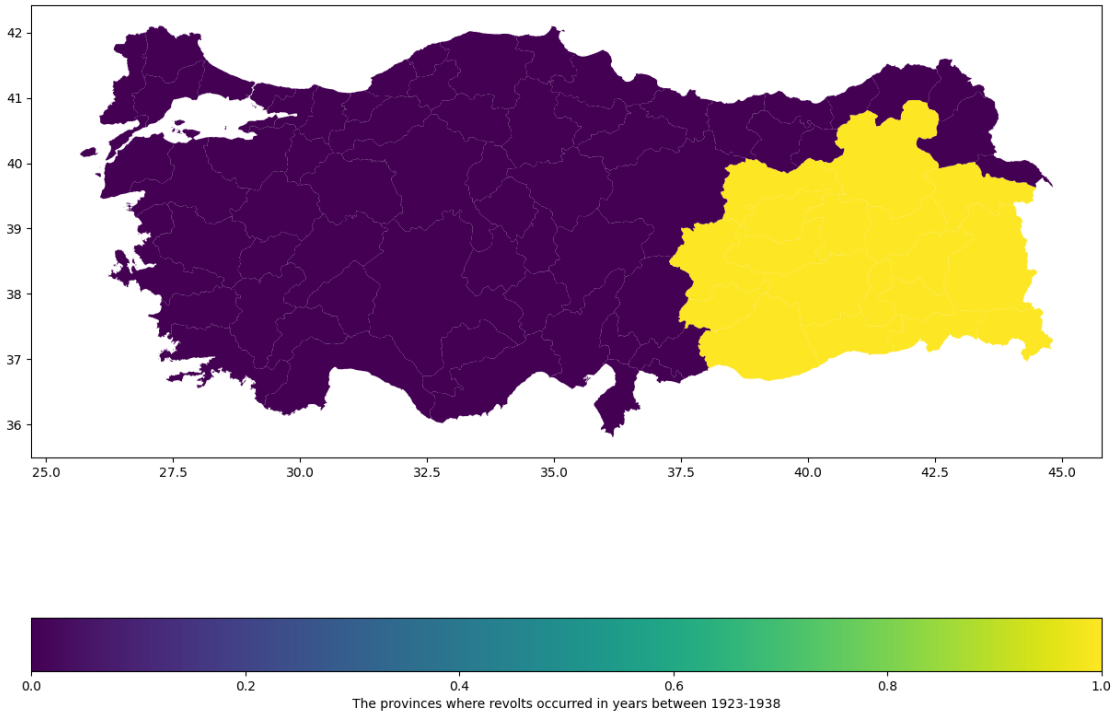
The Number of Crime per 100.000 people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42.5
45.0
0.0
0.2
0.4
0.6
0.8
1.0
The provinces where revolts occurred in years between 1923-1938