Classifying Boroughs and Neighborhoods According to Their Health and Medical Service Capacities

IN METROPOLİS SUCH AS ISTANBUL, ONE OF THE CHALLENGİNG PROBLEMS İS PLANNİNG AND SERVİNG MEDİCAL AND HEALTH SERVİCES.

- **Istanbul is a very large city with a population of nearly 16 million. It has a population density of 2844 people per square kilometer.**
- **Being such a crowded city leads some health problems in aspects of citizens, especially nowadays when COVID-19 seriously threaten humanity. With a high population, health service planning becomes one of the major responsibilities for government and local managements.**
- **Authorities should effectively determine areas with weak health services and medical establishments and orient the funds for developments of health services in those areas.**

DATA DESCRİPTİON

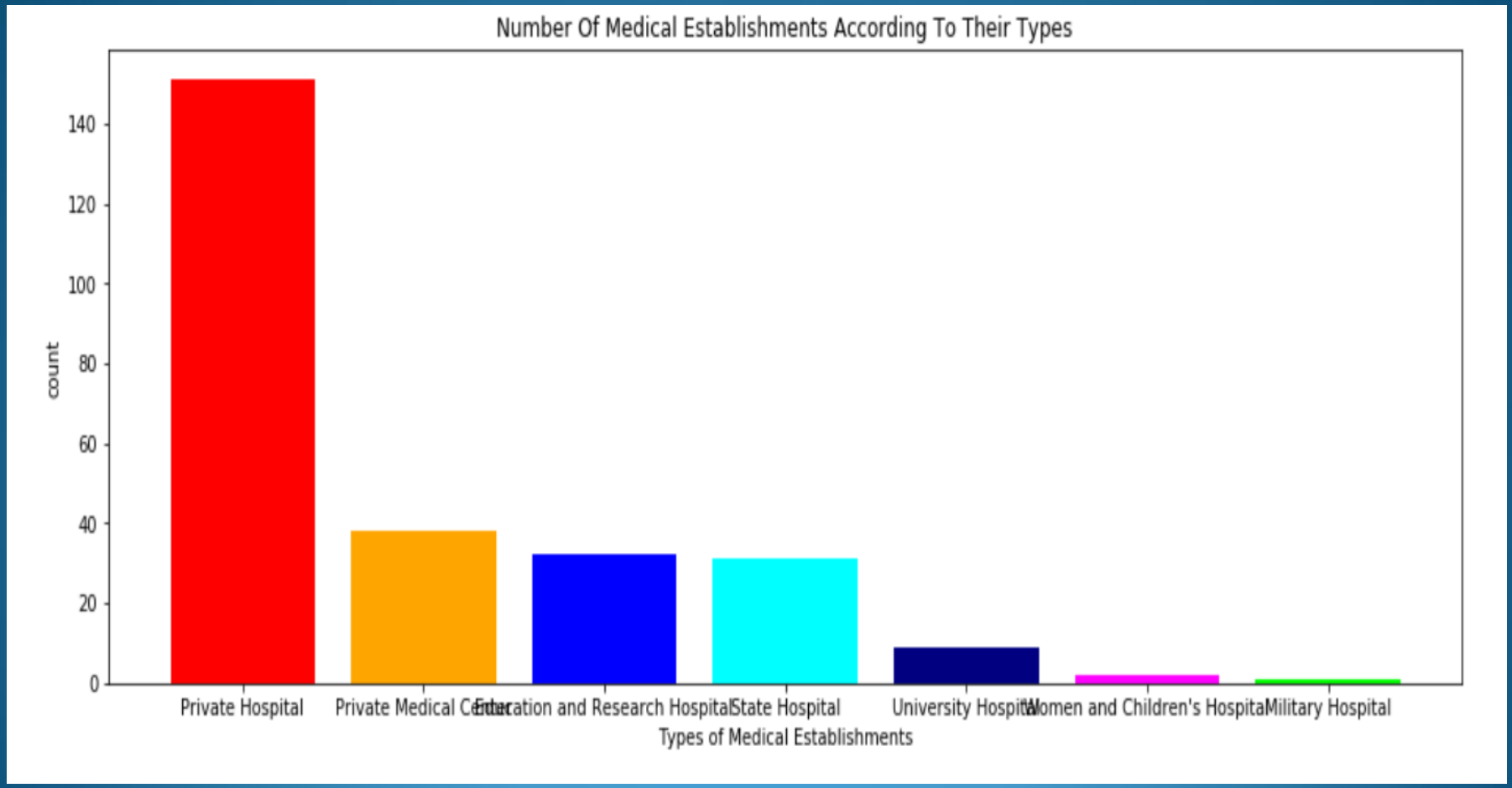
- **Used infos in this project are:**

- **number of existing medical establishments in the neighborhood (specific type of health care services)**
- **number of beds, if any**
- **capabilities of emergency service or ambulance.**

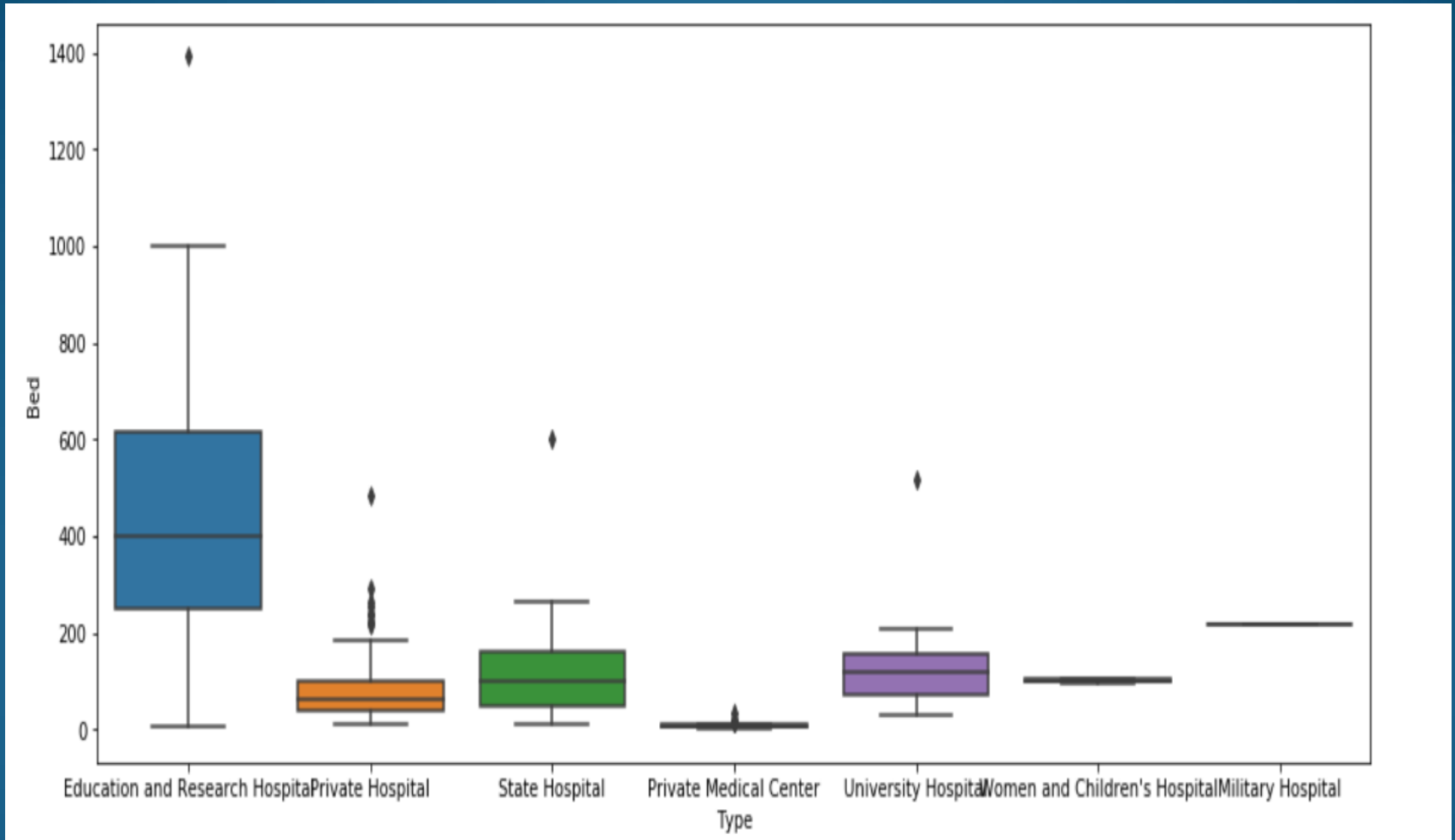
- **The Data is in the form of CSV. It is provided by Istanbul Municipality IT Department.**

- **This project is just a case study example and may not yield high quality results for real life. For more accurate results, the data set must be expanded.**

DATA ANALAYSIS



DATA ANALAYSIS



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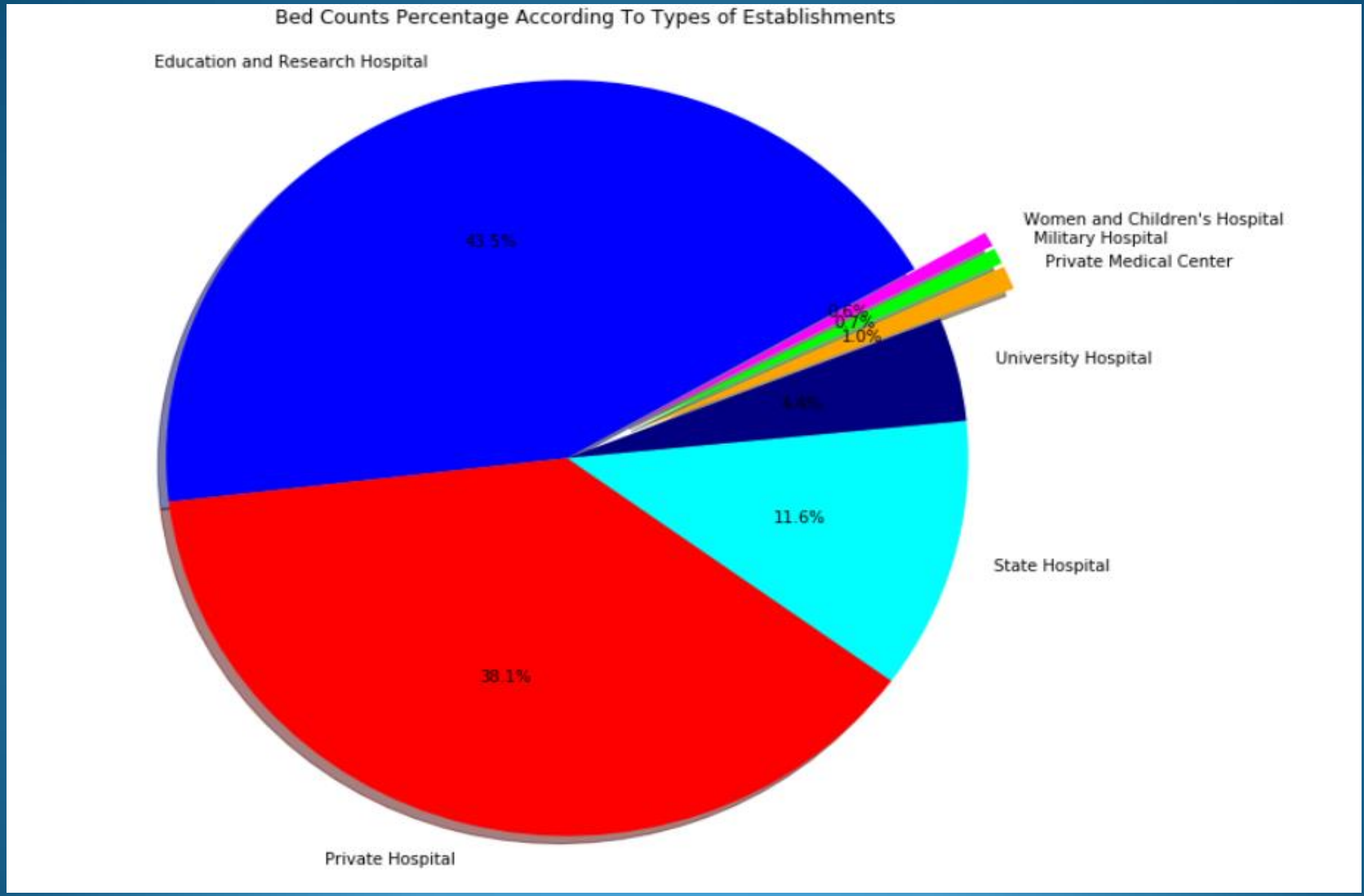
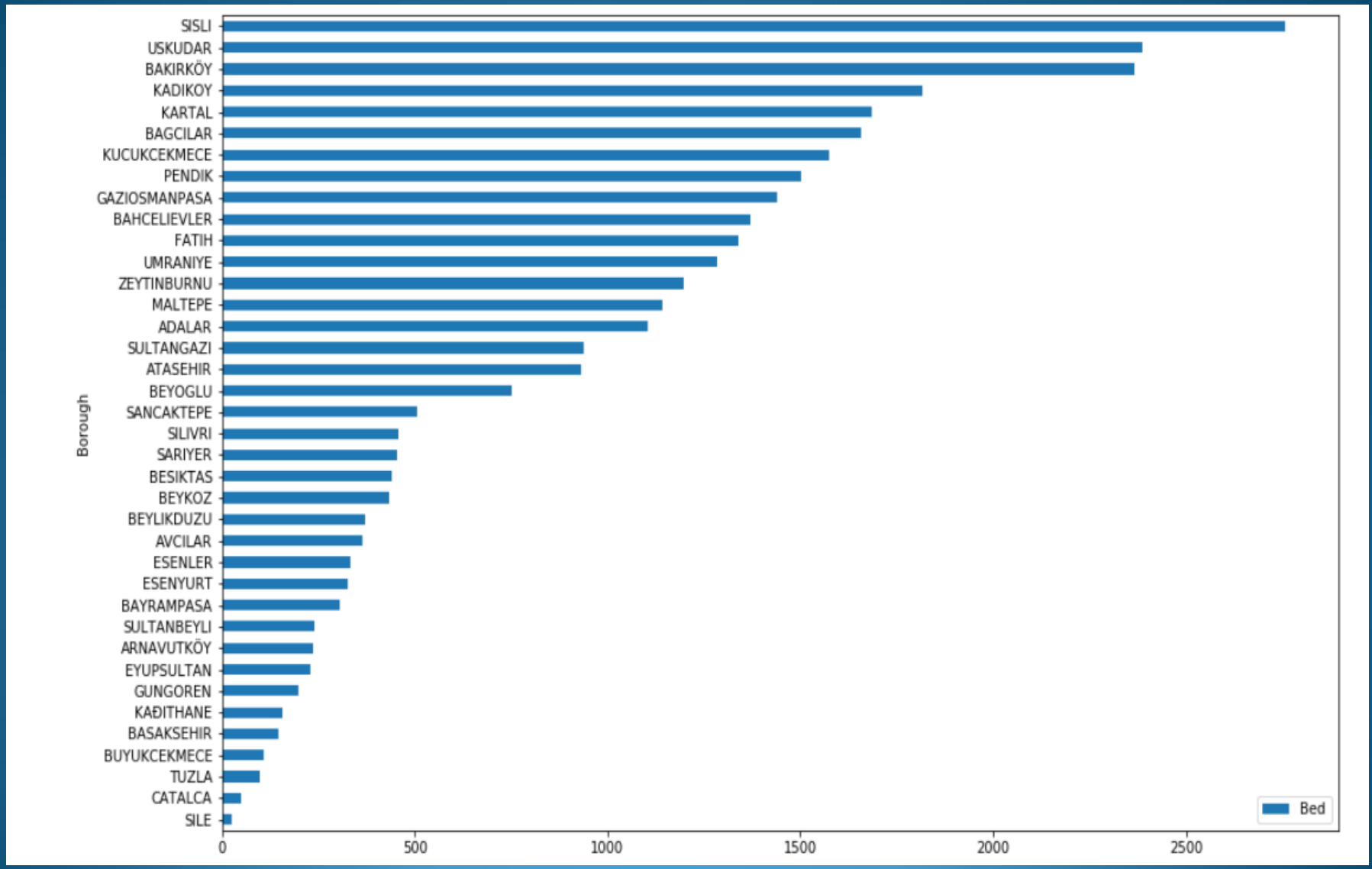


DATA ANALAYSIS

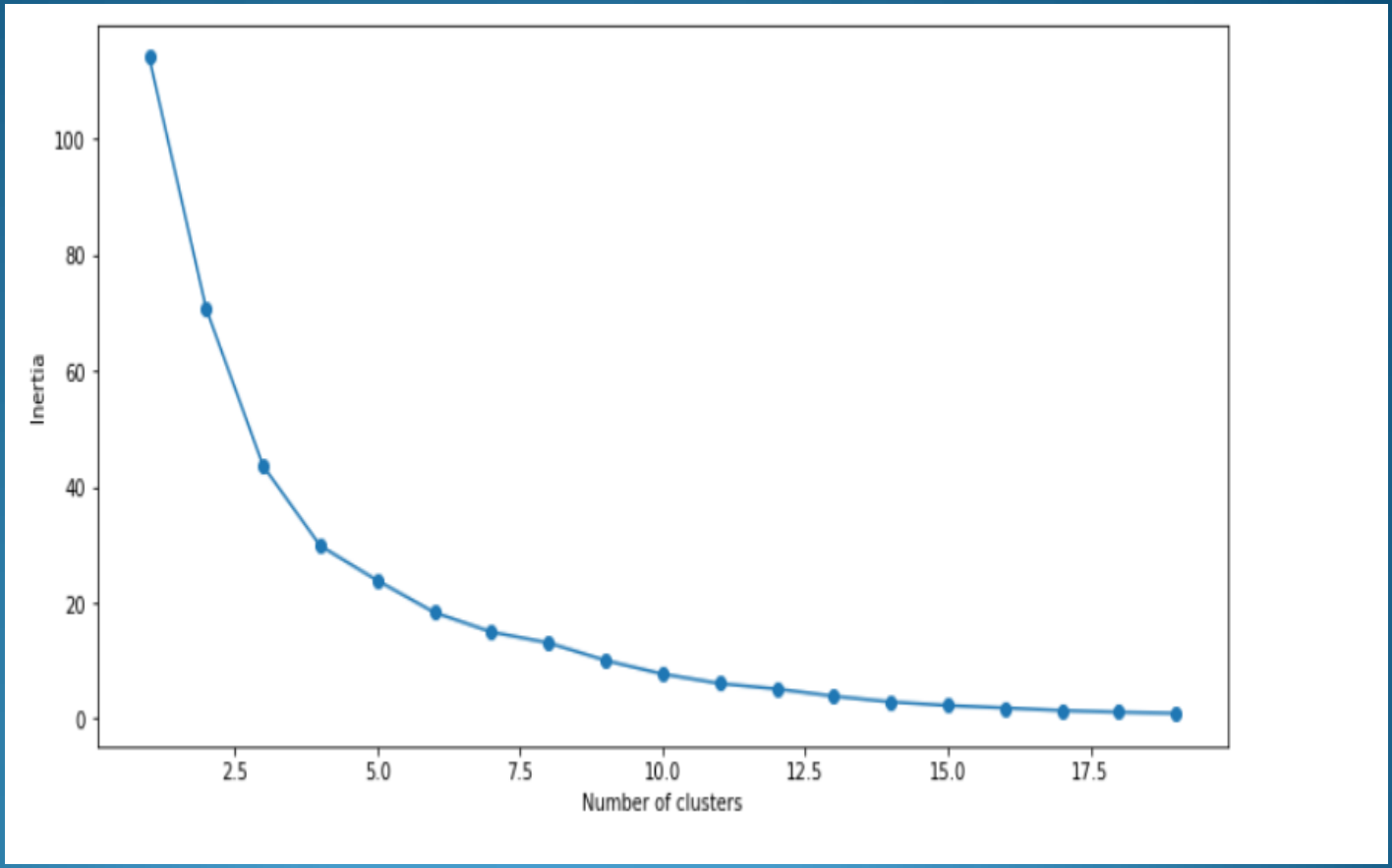


DATA ANALAYSIS

	Borough	Emergency_Service_Ratio	Ambulance_Ratio	Bed_Counts	First Aid Station	Latitude	Longitude	Firs Aid Ratio
0	ADALAR	1.000000	1.000000	1105.0	4	40.870022	29.128099	4.00
1	ARNAVUTKÖY	1.000000	0.500000	235.0	2	41.179635	28.745557	1.00
2	ATASEHIR	1.000000	1.000000	930.0	3	40.977382	29.107801	3.00
3	AVCILAR	1.000000	0.500000	366.0	0	40.991604	28.717076	0.00
4	BAGCILAR	0.916667	0.458333	1658.0	6	41.042299	28.844779	2.75

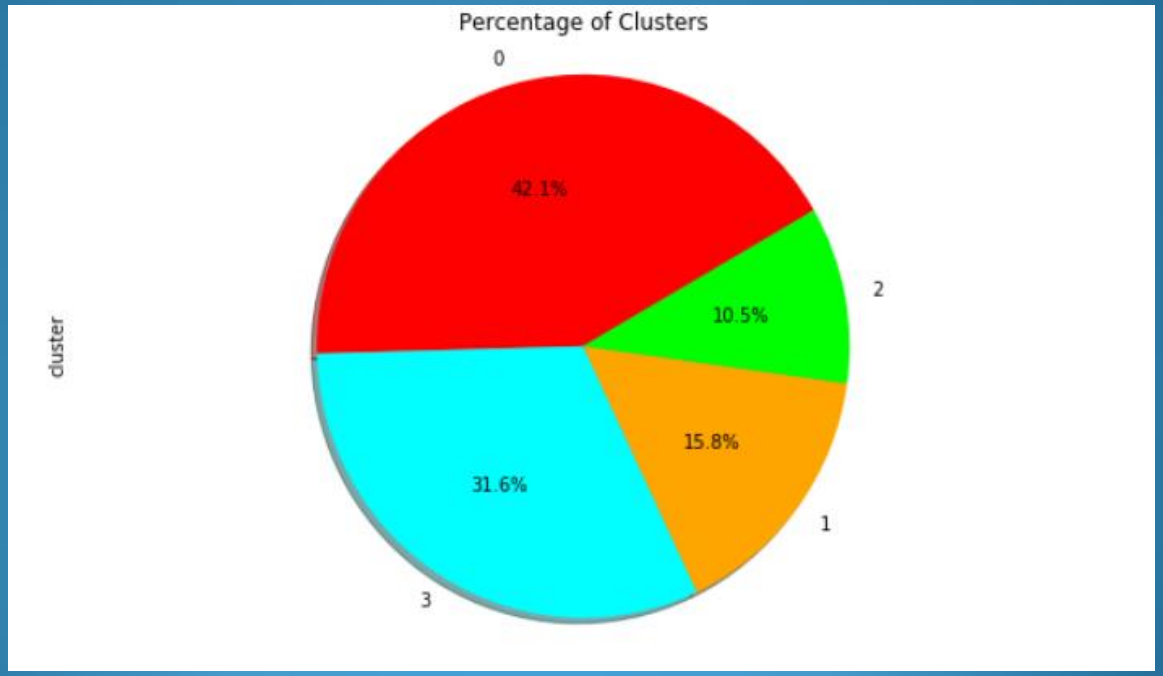
- **Now we are approaching a meaningful table for clustering. We are trying to collect all kind of info about boroughs in form of numbers about health and medical service capability. We are merging two frame and adding First Aid Station number. After we are trying to find aid capability radio by multiplying number of first aid stations and ambulance ratio.**

MODELING


Inertia
100
80
60
40
20
0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Number of clusters

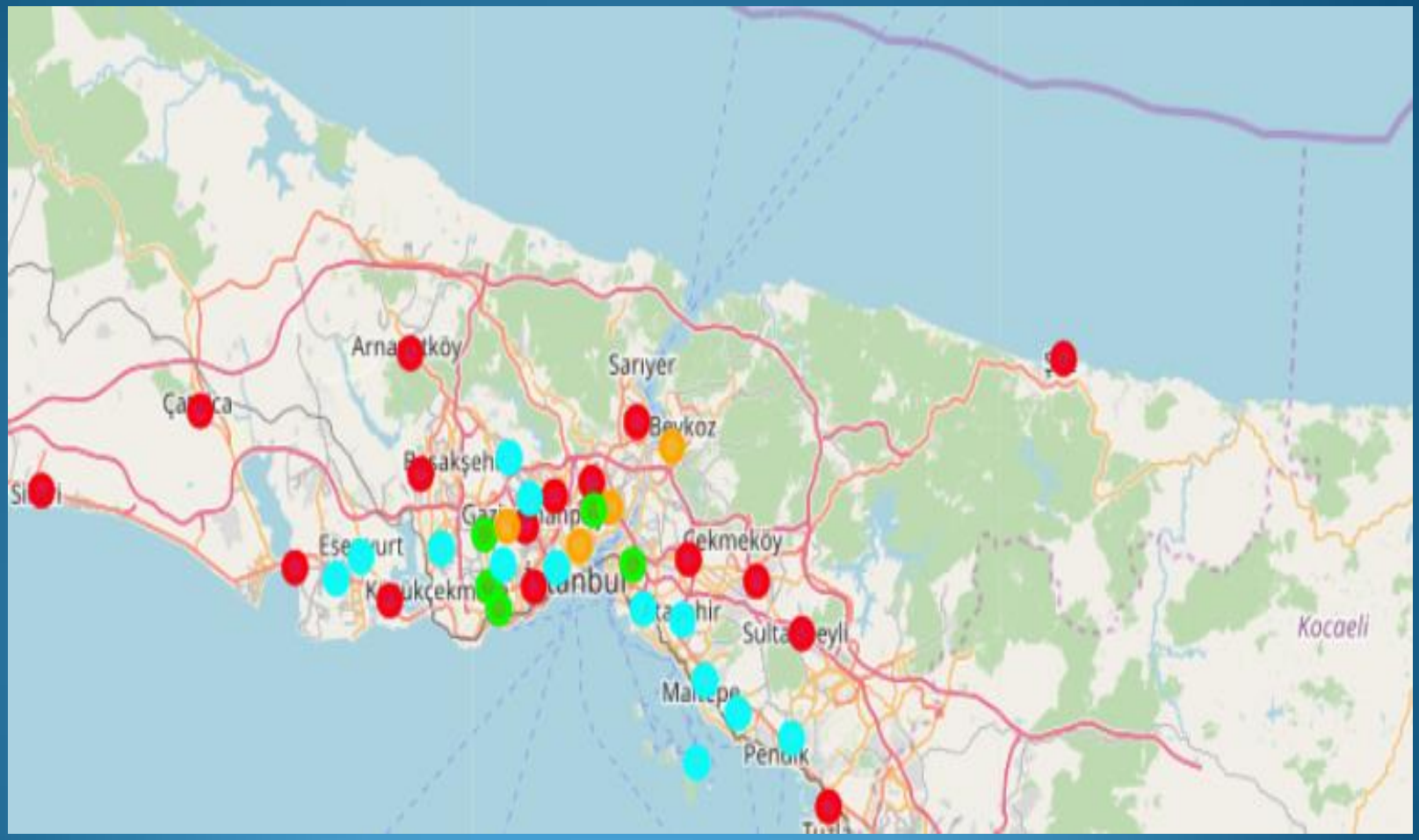
RESULTS

- So, we have 4 differentt cluster produced by K-means. We can assess them as:
  Very High Capacity, no precedence
  - High Capacity, no precedence
  - Normal Capacity, to be considered
  - Low Capacity, have precedence



RESULTS

At last we can Show classified boroughs according to their heath and medical capacity in forms of different colors according to their cluster.



CONCLUSİON

- In this project we tried to find a way to classify boroughs and neighborhoods of Istanbul by analyzing data and using classification algorithms.

- We used dataset which is provided by Istanbul Municipality Open Data Platform. This data set is providing limited information about medical capabilities. It should be considered health and medical service planning depends on much more amount and complexity of data. This project is just a case study example and may not yield high quality results for real life. For more accurate results, the data set must be expanded.

- We used the K-means algorithm as classification tool. We determined optimum k value by Elbow method.

- We classified boroughs into four clusters by means of their health and medical capabilities. At last we visualized clusters on Istanbul map by different colors according to their clusters.