German Hospitals in Covid Crisis

Occupancy of hospital beds in German States

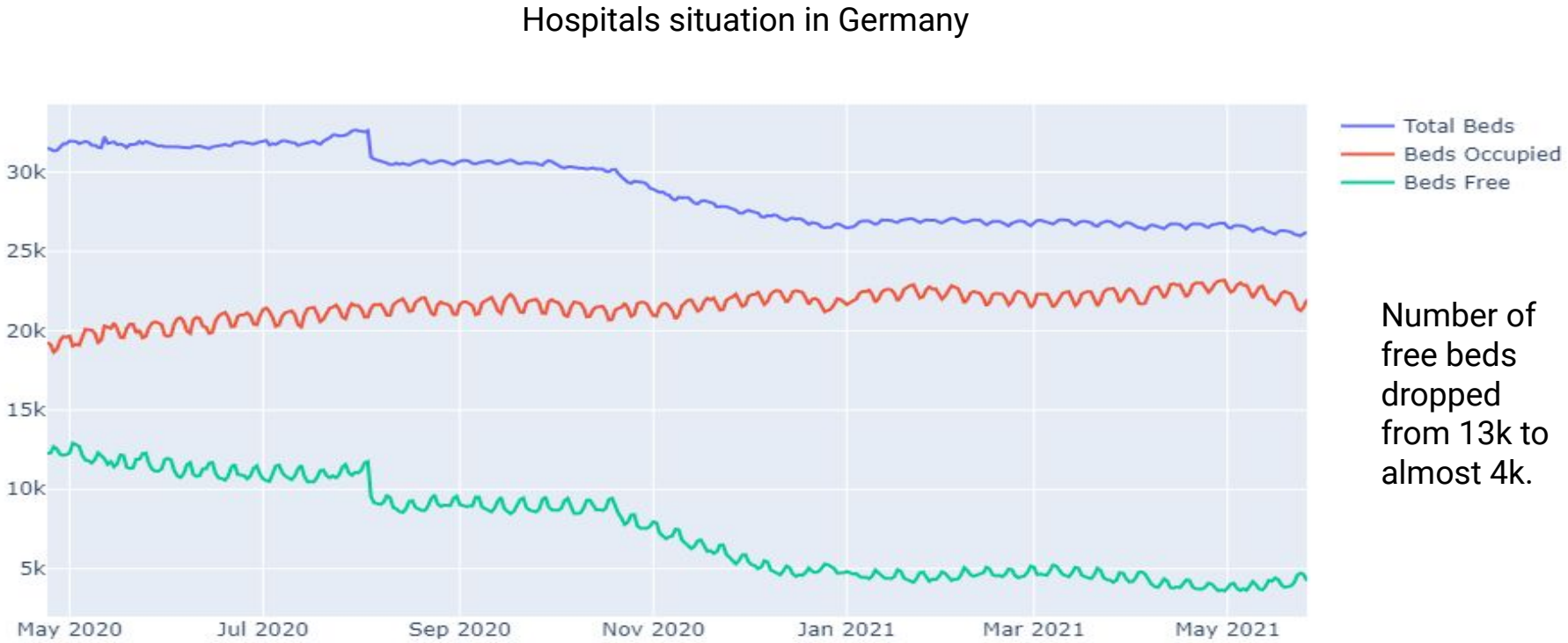
Problem Statement & Hypothesis

- Covid crises took a great toll on many sectors especially health care services throughout the world.
- As the number of covid cases arose and the demand of ICU care for severe patients also increased.
- This resulted in scarcity of beds available for patients that caused great concern for Govt.
- We will analyze the situation in German states with the aim to figure out where the hospitals are under great pressure.
- If the number of available bed fall short the demand while the covid cases are rising, then this scenario will result in bigger calamity that will fuel more deaths.

Dataset Description

- Dataset for this task is obtained from official Government website DIVI intensive care register. https://www.intensivregister.de/
- It provides real-time data acquisition of treatment capacities in intensive care medicine and aggregated case numbers for Germany.
- We decided to go ahead with the “Time series Data Daily” dataset that recorded since April 24, 2020.
- The data have 157843 rows × 12 columns.
- Columns include `'date', 'state_id', 'county_id', 'num_locations','num_reporting_loction', 'cases_covid_aktuell', 'cases_covid_intensive','beds_free', 'beds_occupied', 'beds_occupied_adults','beds_free_adult'.`
- We created a new column of beds_total. To calculate the percentage of occupied beds.

Data Visualisation

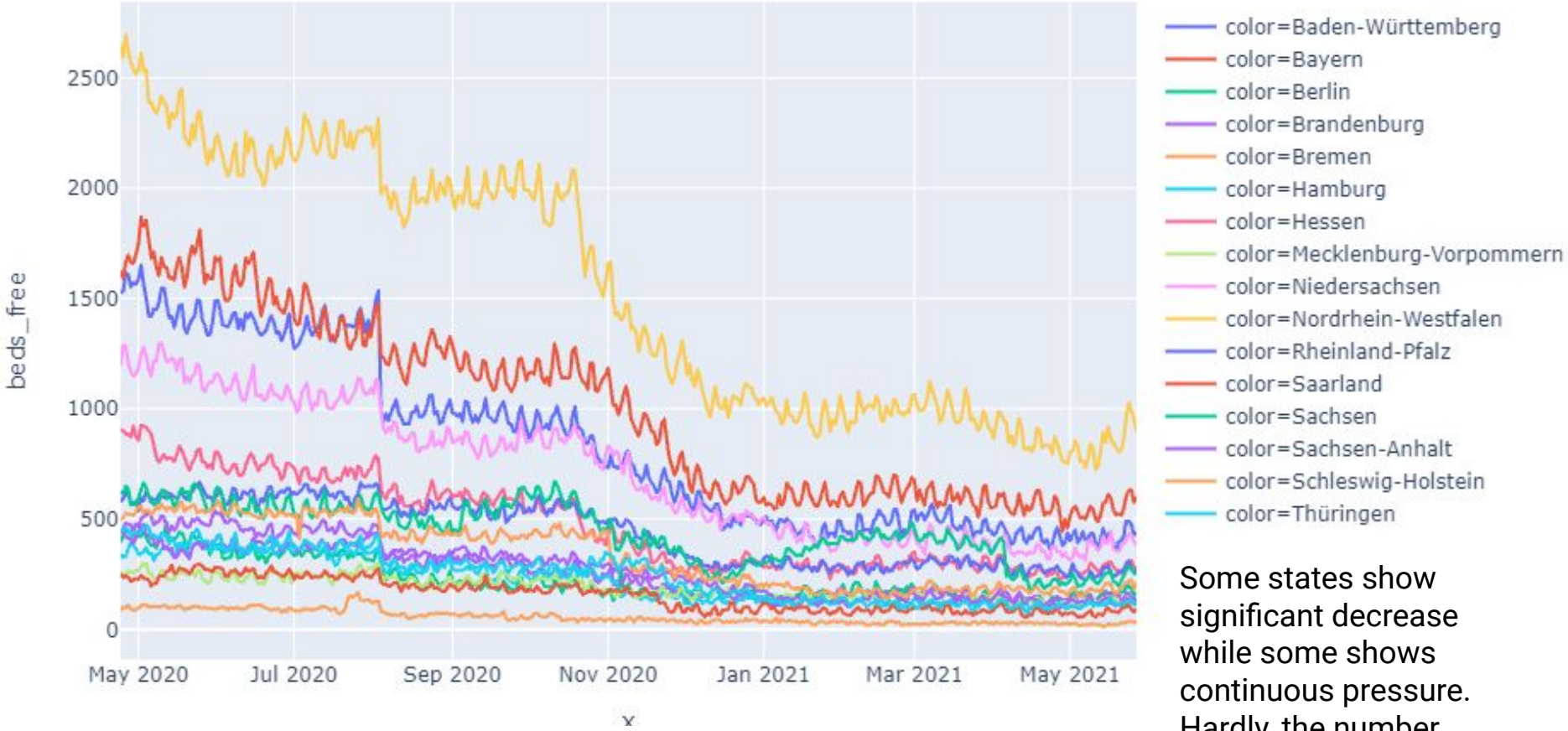


Number of free beds dropped from 13k to almost 4k.

Active cases vs Cases in Intensive care

Despite the difference between active cases and intensive care patients. The numbers rose significantly in Jan 2021 & May 2021

Number of free beds in States



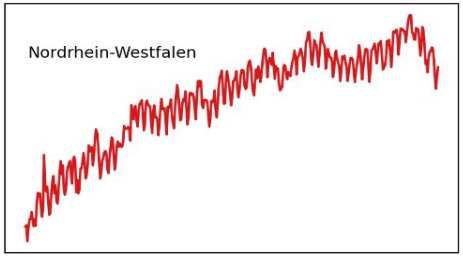
Nordrhein-Westfalen and Bayern are the largest states by population that are hugely under pressure.

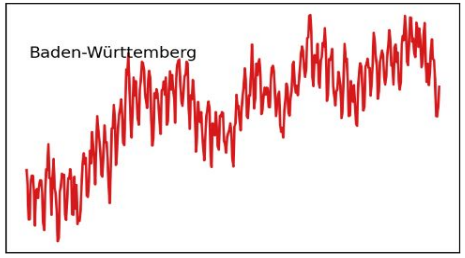
Some states show significant decrease while some shows continuous pressure. Hardly, the number increases.

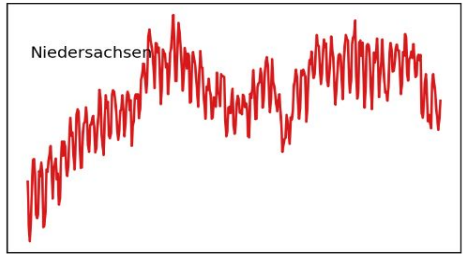
K-means

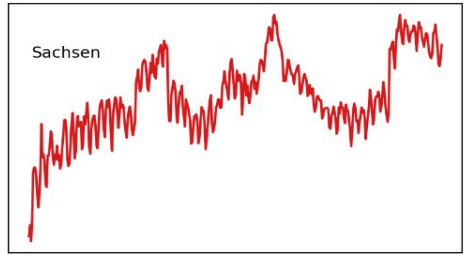
Machine Learning Method

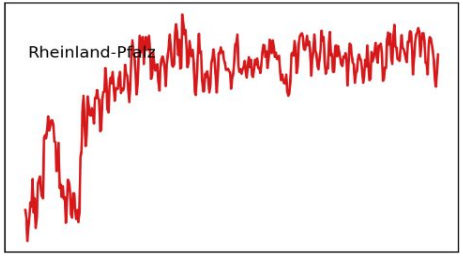
We will use combined **P**rinciple **C**o-ordinates **A**nalysis (**PCoA**) with **k-mean clustering** to plot similarities of states/regions incremental patterns on a 2-D dimension and classify them into groups. This will help identify the states that are under great threat of healthcare strain.

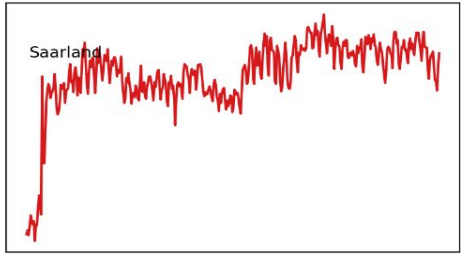

Nordrhein-Westfalen

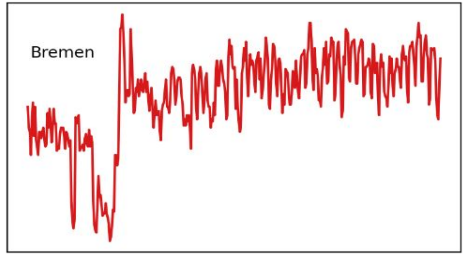

Baden-Württemberg

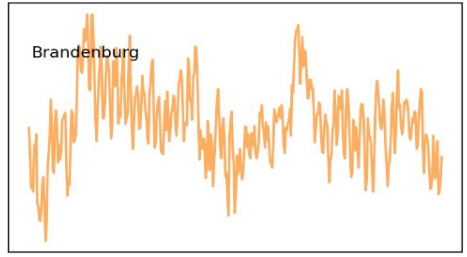

Niedersachsen


Sachsen

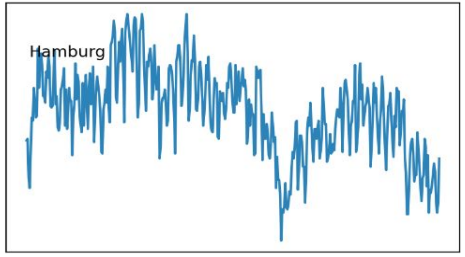

Rheinland-Pfalz

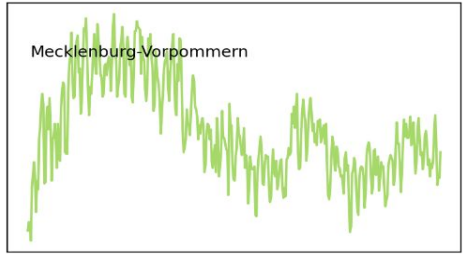

Saarland

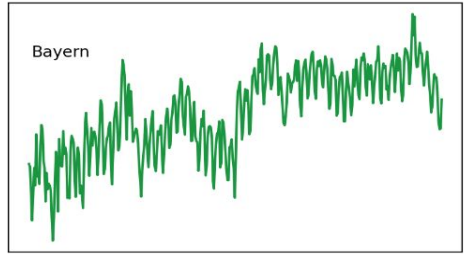

Bremen

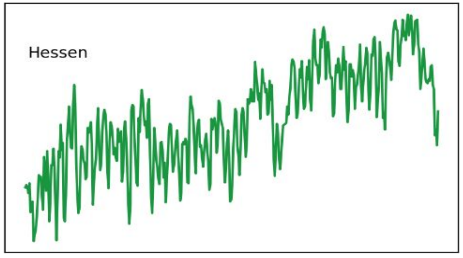

Brandenburg

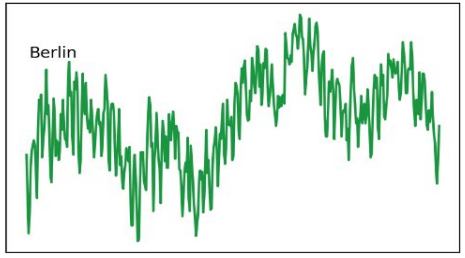

Schleswig-Holstein

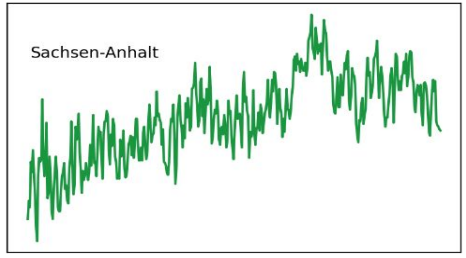

Hamburg

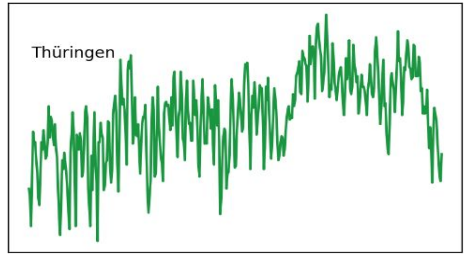

Mecklenburg-Vorpommern


Bayern


Hessen

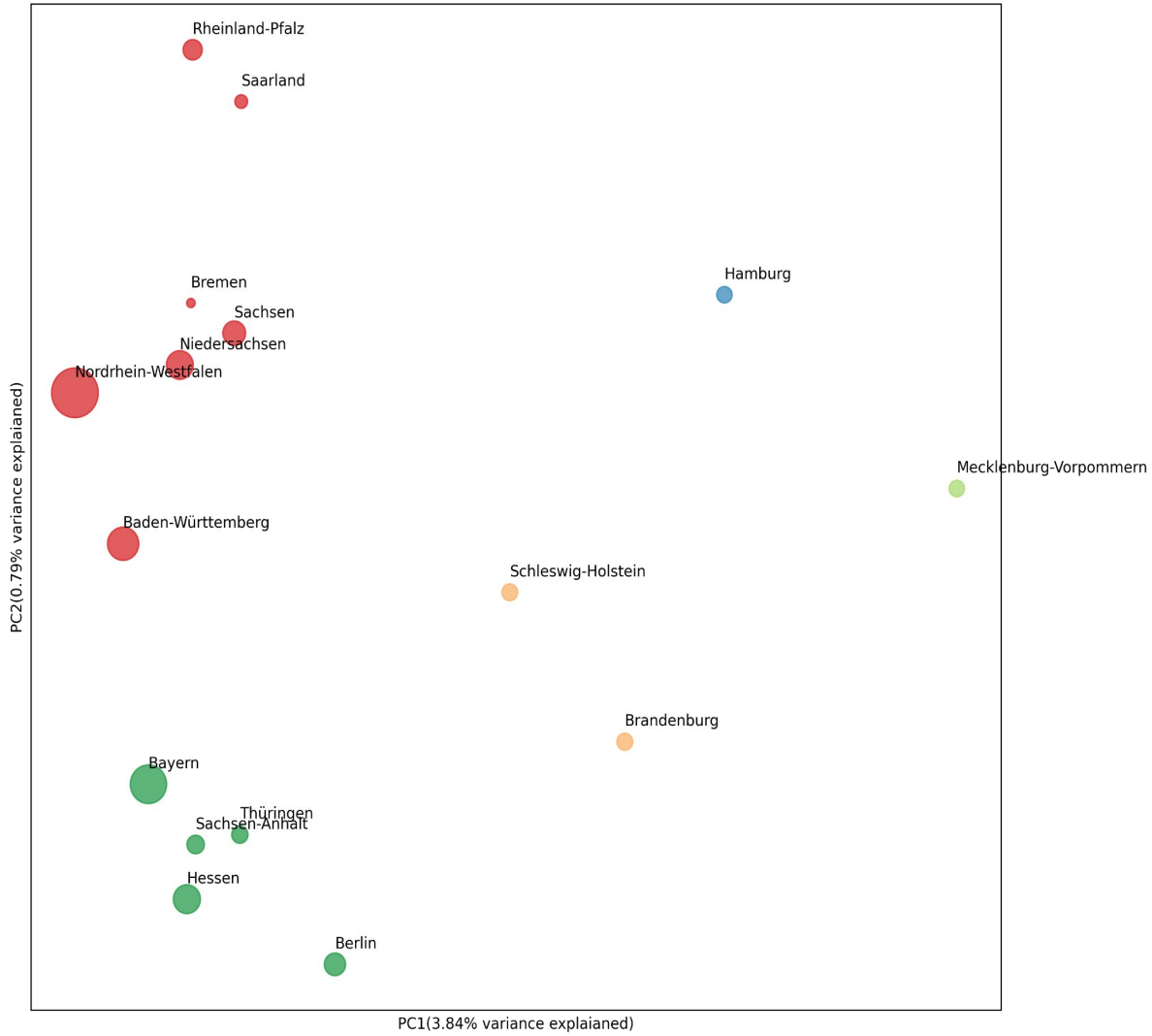

Berlin


Sachsen-Anhalt


Thüringen

Cluster results

- States with dramatic changes in availability of mean of occupied beds are shown in red colored cluster. We can see the sudden increase the above chart.
- Some states where there is high congestion of population doesn’t show much change. For example in case of Berlin. The occupancy rate shows a consistent pattern.
- Some states shows pattern that can be the result of effective measure to keep situation in control.



Occupied Beds clusters

- Nearby regions have similar patterns
- Color shows the .clusters that are in similar situation
- Red color means that are under great pressure while green means that are not much changed.
- Size of data shows the number of change.

Conclusions

- Red clusters shows the states under threat.
- Free available beds are decreasing in most states.
- States under threat needs measures to cope with situation.
- This observation can be combined with further covid data to make deep insights.