

Clustering of countries based on measures

For calculating the epidemic age, we considered t_0 the day when the number of confirmed cases reaches 10.

Implemented measures are separated in three groups based on time of implementation:

"anticipatory measures": implemented before t_0 (day when 10 cases were reported);

"early measures": implemented between t_0 and day when 200 cases were reported;

and "late measures": implemented after day when 200 cases were reported.

Each country is described with three variables:

1. Number of Anticipatory measures

2. Number of Early measures

3. Number of Late measures

KMeans

Optimal number of clusters is chosen based on total wittiness.

I removed all "Risk communication" measures.

I chose 29 most frequent measures (at least 15 countries)

- [1] "Airport health check"
- [2] "Border health check"
- [3] "Enhance detection system"
- [4] "Isolation of cases"
- [5] "Quarantine"
- [6] "Tracing and monitoring"
- [7] "Environmental cleaning and disinfection"
- [8] "Activate emergency response mechanisms"
- [9] "Activate notification of cases"
- [10] "Enhance emergency response mechanisms"
- [11] "Enhance laboratory testing"
- [12] "Increase availability of PPE"
- [13] "Increase healthcare workforce"
- [14] "Increase in medical supplies and equipment"
- [15] "Increase patient capacity"
- [16] "Scale up emergency response mechanisms"
- [17] "Crisis management plans"
- [18] "Closure of educational institutions"
- [19] "Mass gathering cancellation"
- [20] "Measures for special populations"
- [21] "Return operation of nationals living in regions at risk"
- [22] "Small gathering cancellation"
- [23] "Airport restriction"
- [24] "Border restriction"
- [25] "Cancellation of international flights"
- [26] "Cordon sanitaire"
- [27] "Denial entry to boats with more than 100 passengers"
- [28] "Individual movement restrictions"
- [29] "National lockdown"

RESULT:

K-means clustering with 7 clusters of sizes 6, 6, 8, 7, 9, 8, 8

Cluster means:

	Anticipatory_measures	Early_measures	Late_measures
1	9.000000	8.333333	2.166667
2	2.666667	8.000000	7.166667
3	7.125000	2.500000	1.375000
4	2.285714	0.571428	8.285714
5	2.444444	9.222222	1.666667
6	14.375000	2.500000	0.625000
7	7.500000	2.625000	9.750000

Clustering vector:

```
[1] 3 7 3 5 7 7 6 1 4 1 6 2 4 2 7 7 3 6 1 3 2 3 5 7 5 6 2 6 5 3 5 2 3 4 6 4 1 5 4 5 6 5 1 3  
[45] 2 7 4 7 6 1 5 4
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Within cluster sum of squares by cluster:

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[1] 40.16667 78.16667 60.75000 58.57143 99.77778 101.75000 83.37500  
(between_SS / total_SS = 80.3 %)
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```
> countries_with_measures[which(cluster.results$cluster==1)]  
[1] "Czechia" "Ecuador" "Hungary" "New Zealand" "Singapore" "Taiwan*"  
> countries_with_measures[which(cluster.results$cluster==2)]  
[1] "Estonia" "France" "India" "Korea, South" "Malaysia"  
[6] "Slovenia"  
> countries_with_measures[which(cluster.results$cluster==3)]  
[1] "Albania" "Belgium" "Honduras" "Iceland" "Indonesia"  
[6] "Liechtenstein" "Mauritius" "Slovakia"  
> countries_with_measures[which(cluster.results$cluster==4)]  
[1] "Denmark" "Finland" "Mexico" "Netherlands" "Norway"  
[6] "Sweden" "United Kingdom"  
> countries_with_measures[which(cluster.results$cluster==5)]  
[1] "Bosnia and Herzegovina" "Ireland" "Japan"  
[4] "Kuwait" "Lithuania" "North Macedonia"  
[7] "Portugal" "Serbia" "Thailand"  
> countries_with_measures[which(cluster.results$cluster==6)]  
[1] "Croatia" "El Salvador" "Hong Kong" "Kazakhstan" "Kosovo" "Montenegro"  
[7] "Romania" "Syria"  
> countries_with_measures[which(cluster.results$cluster==7)]  
[1] "Austria" "Brazil" "Canada" "Germany" "Greece" "Italy"  
[7] "Spain" "Switzerland"
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Happy to get feedback and try new things.