Interventions

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First Year Project #1

February 22nd, 2022

Lecture Plan

1) (February 8th) Intro
2) (February 10th) Geospatial Basics
3) (February 15th) Estimating Associations
4) (February 17th) Multivariate Regression
5) (February 22nd) Interventions
6) **(Today) Project Run Through**
7) (February 24th) Q&A – Open Supervision
8) (March 3rd) Q&A – Open Supervision

My Question

Identify which weather variable had the most significant impact on hospitalizations in Denmark, and see if its effect could be explained with the intensity of government interventions

Outline

- Task 0
- Task 1
- Task 2
- Task 3
- Task 4

Task 0

Data Sources

- Project data
  - Hospitalizations in Denmark
  - Weather in Denmark
- Additional Datasets
  - Stringency Indexes from Oxford

Sanity Checks

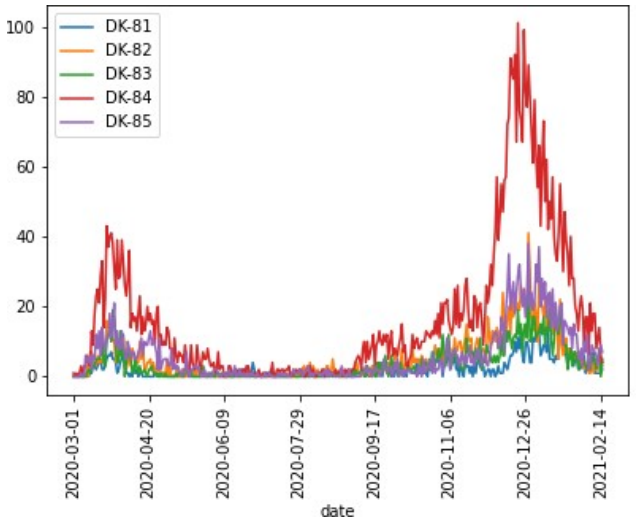
- Weather data: no NAs
- Corona data: no coverage beyond Feb 15th, 2021
- Oxford data: no NAs

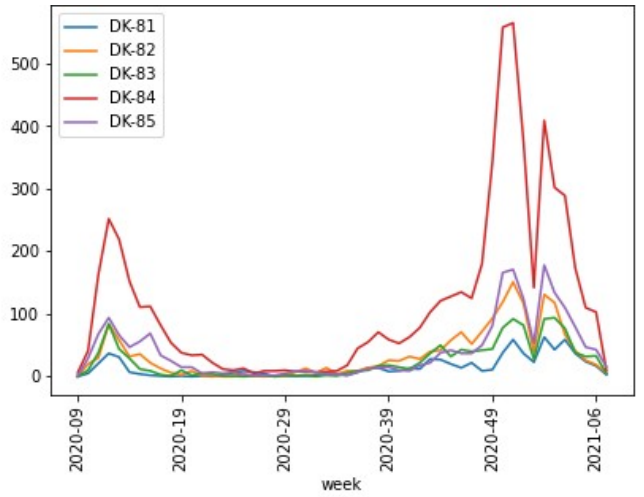
Other Operation

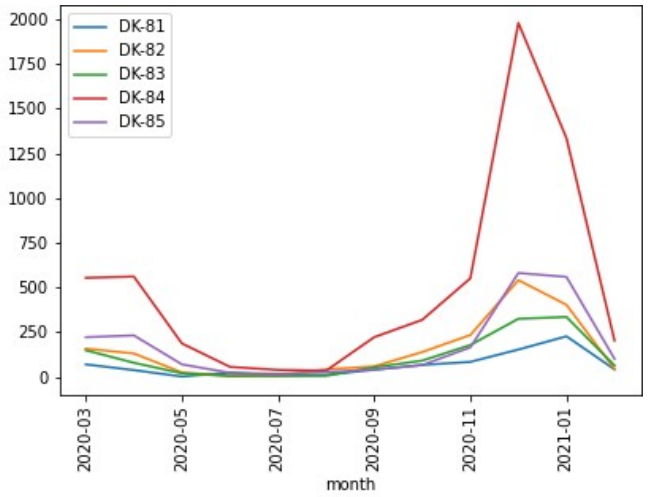
- “date_effect” column = date – 7 days

Task 1

Corona Data

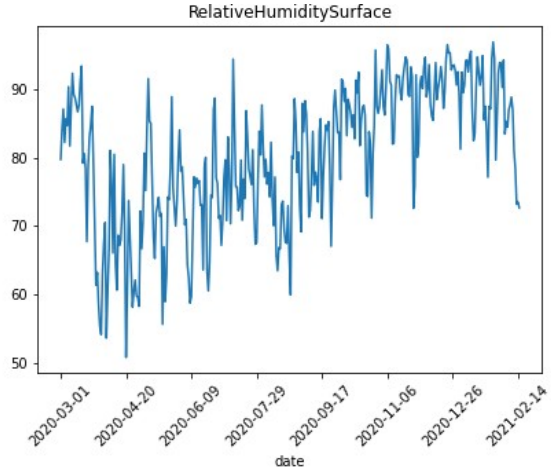


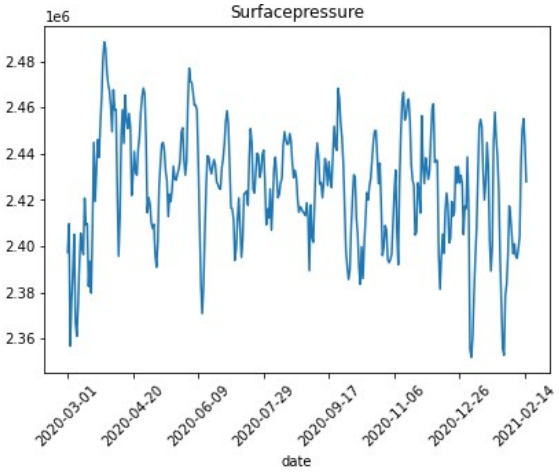


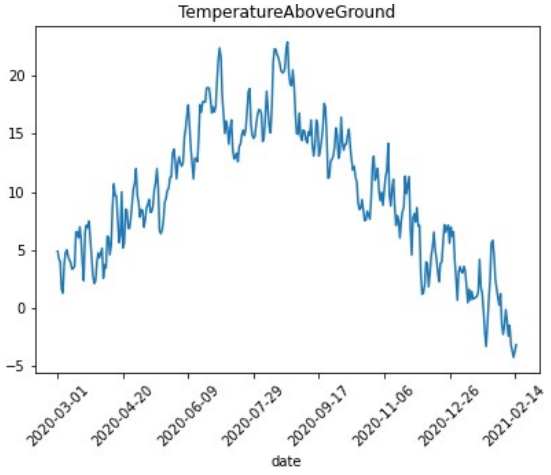


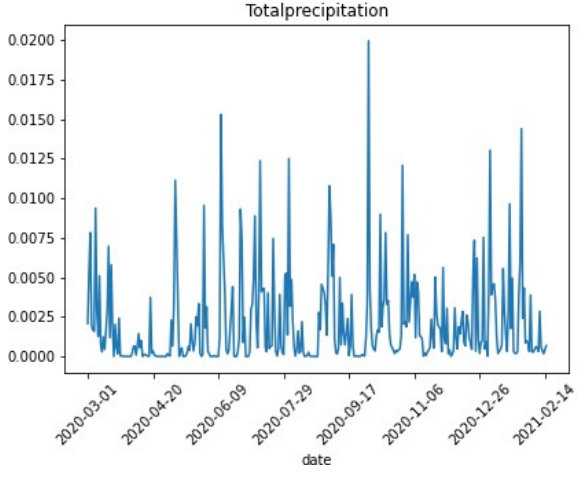
- Most days: low hospitalization
- Big spikes for few days
- Log-transform

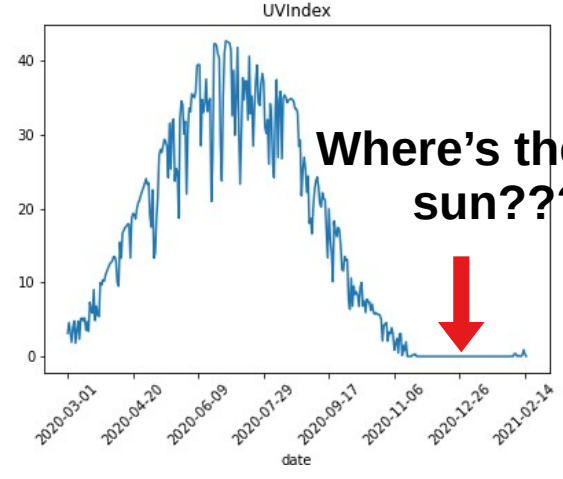
Weather Data



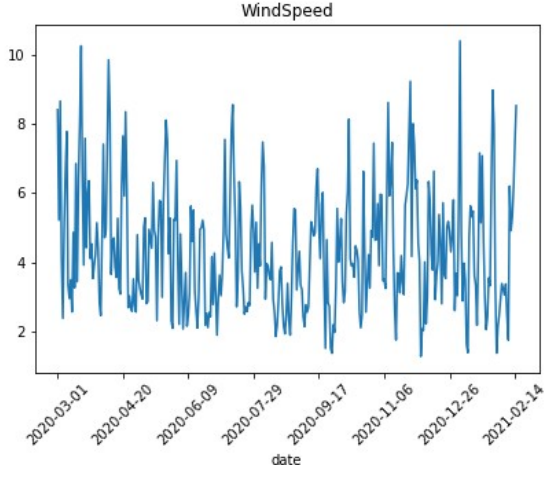




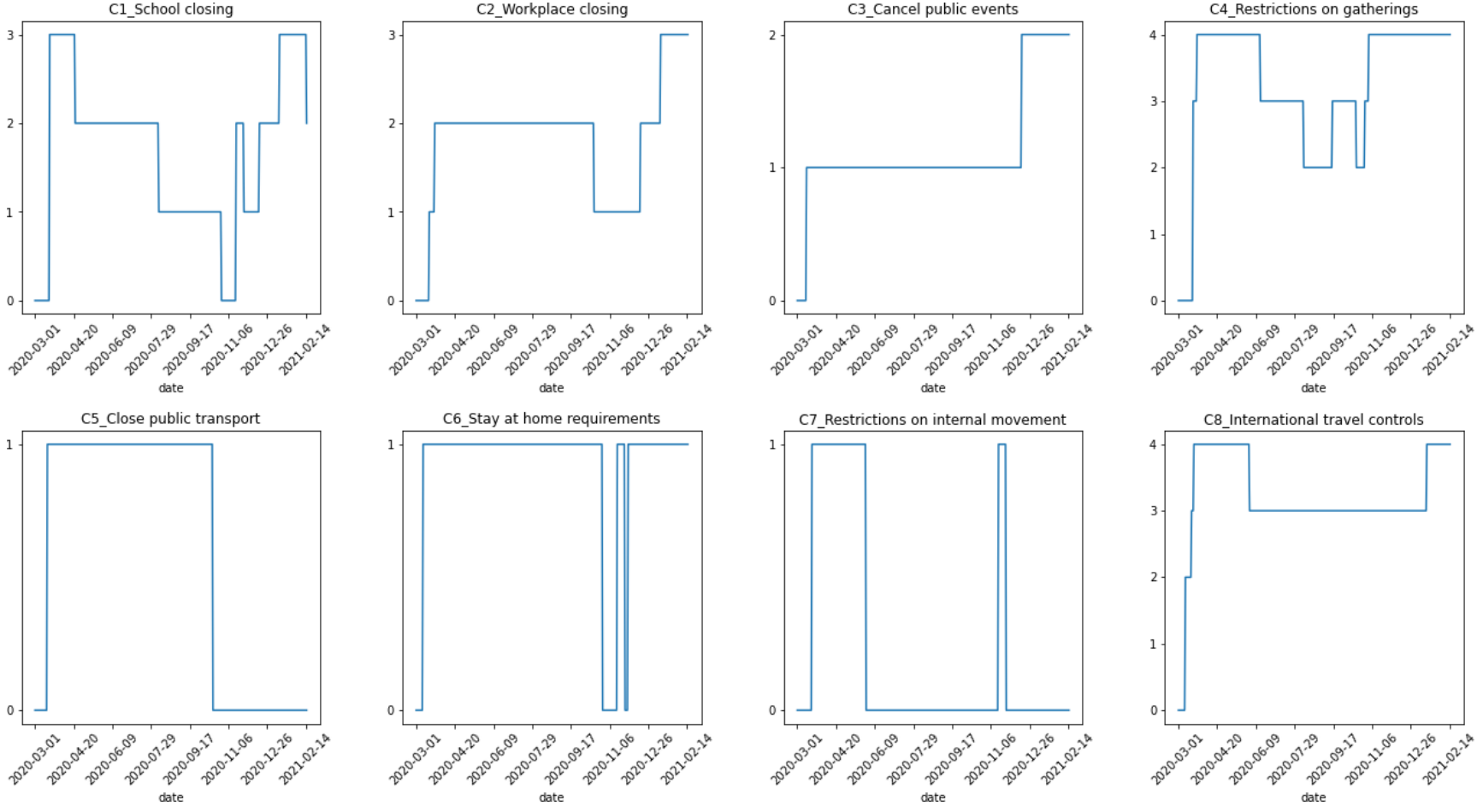




Where's the sun???

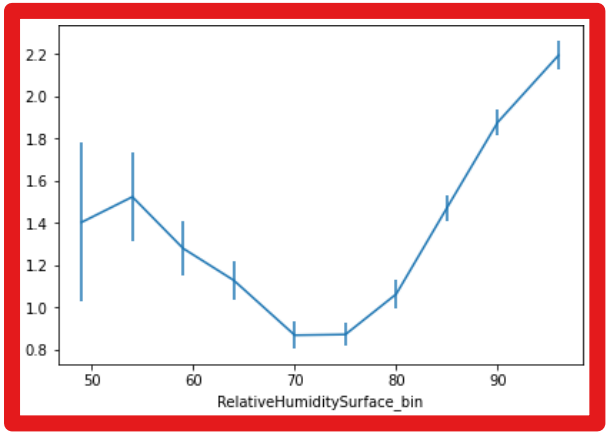


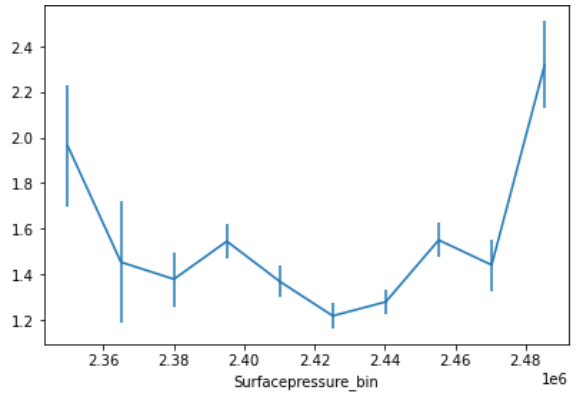
Stringency Index

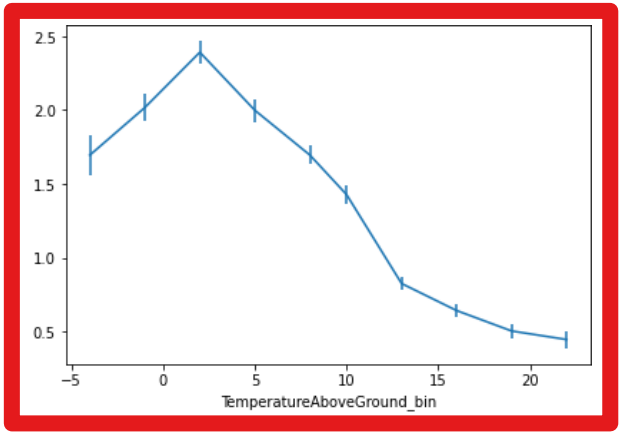


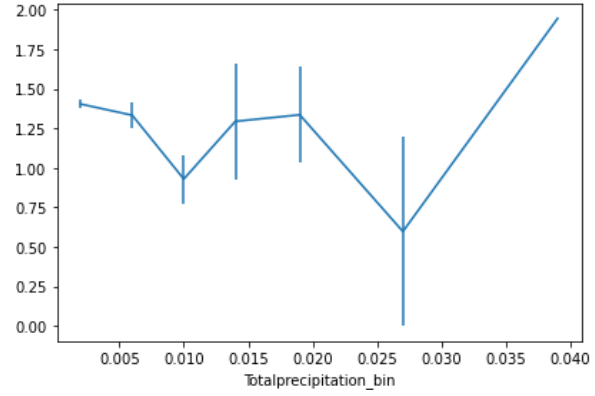
Task 2

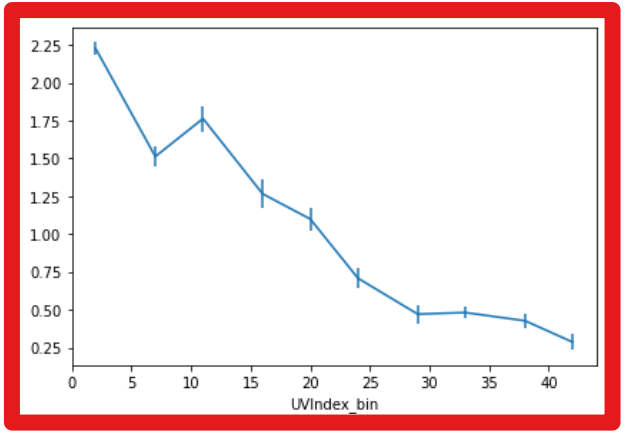
Weather-Hospitalizations

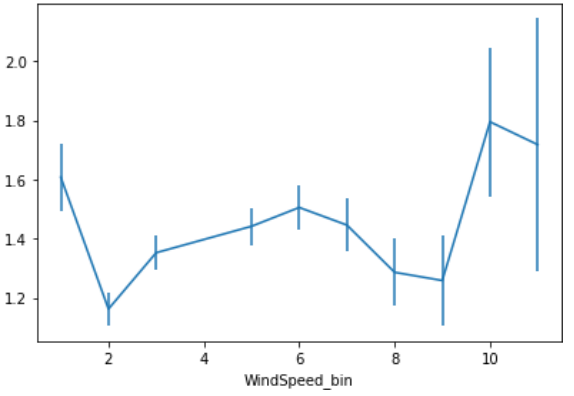






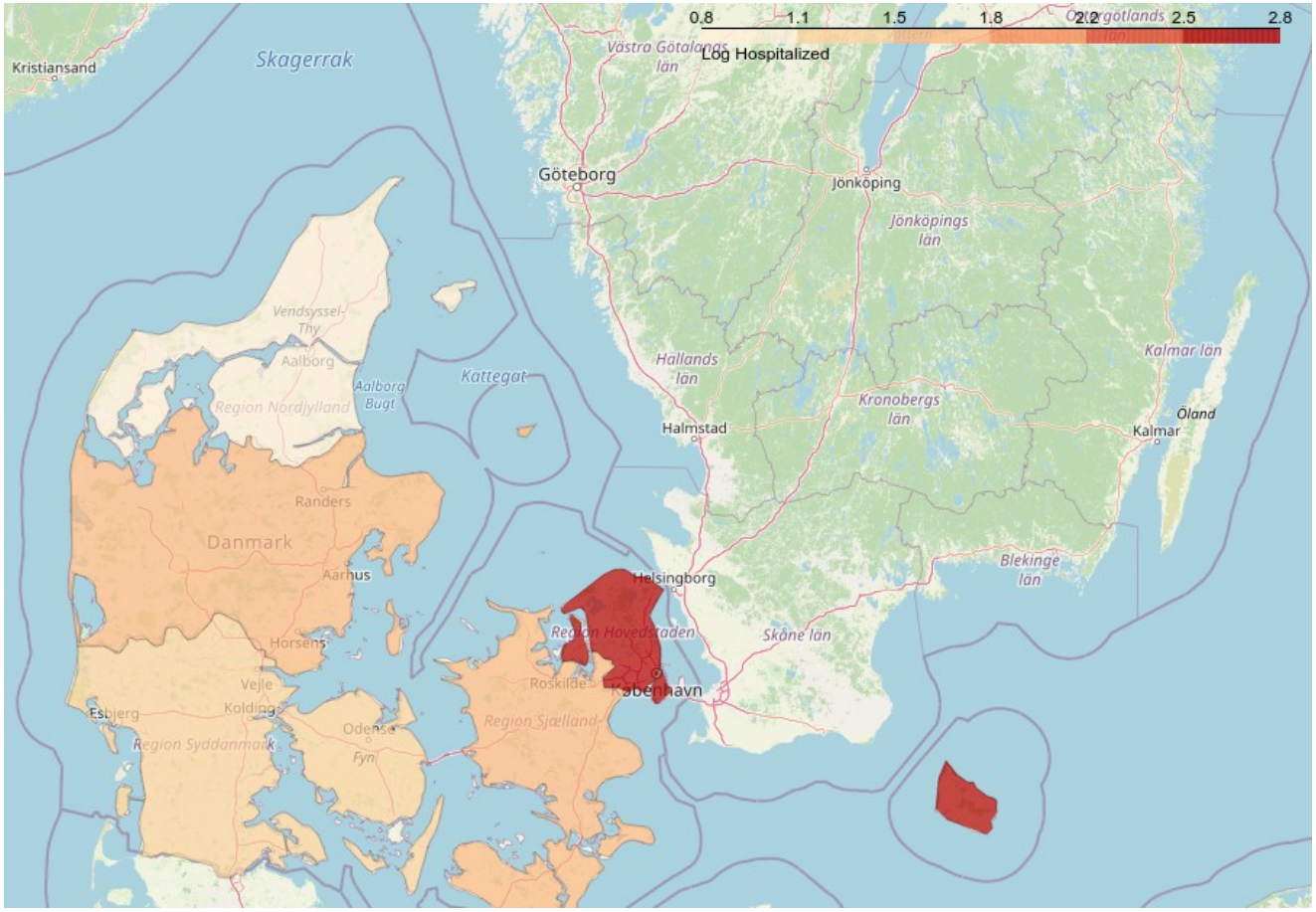






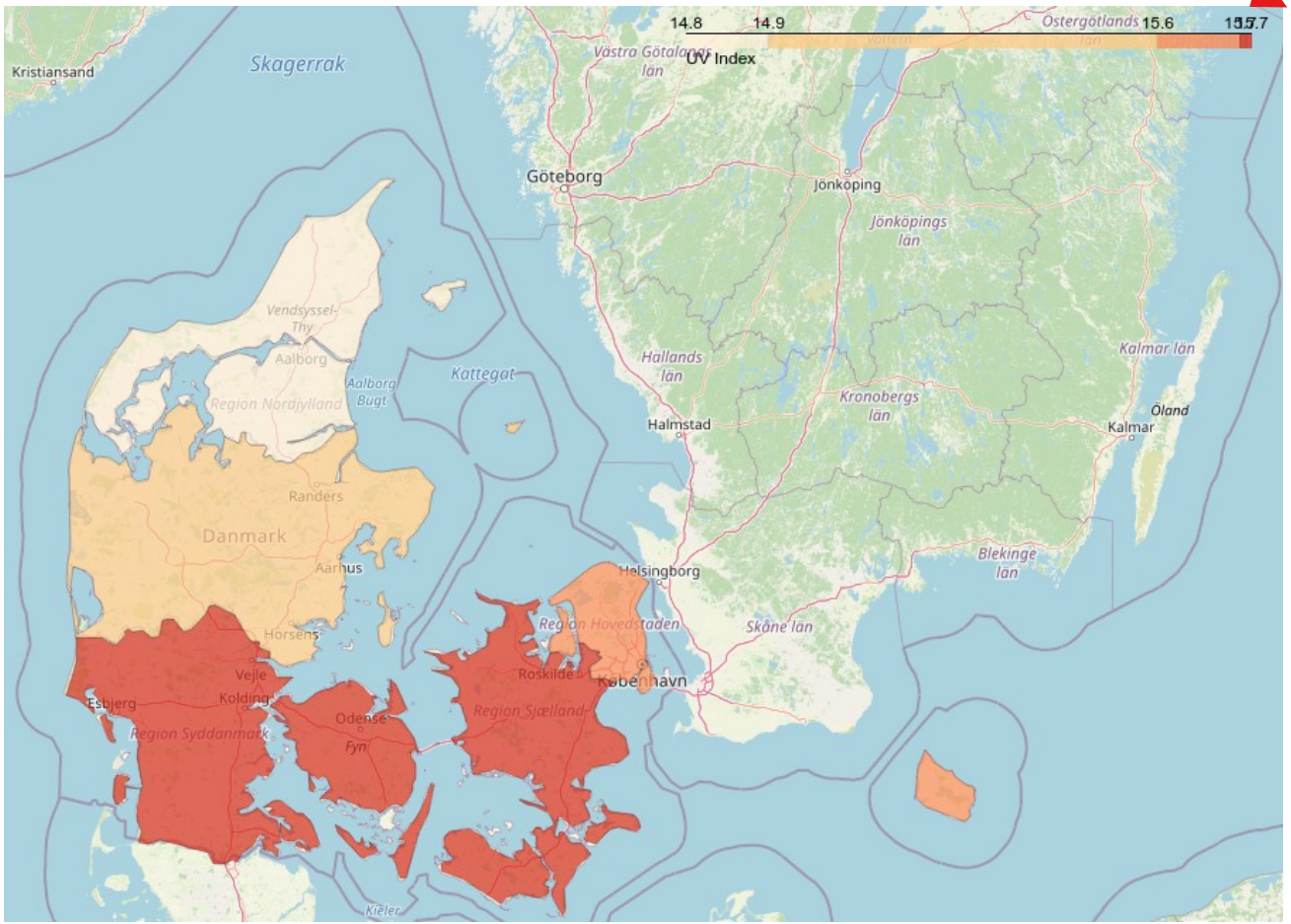
Task 3

Log Hospitalized

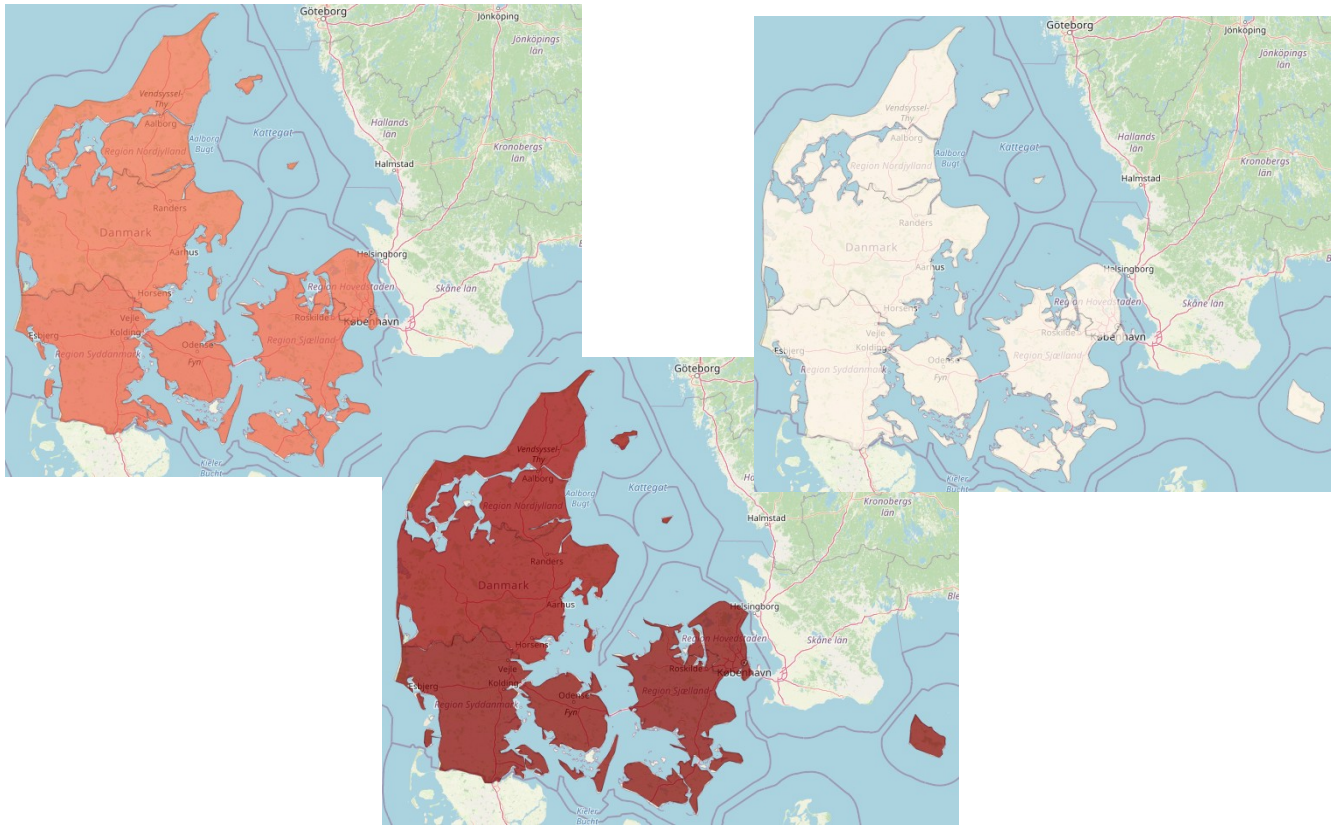


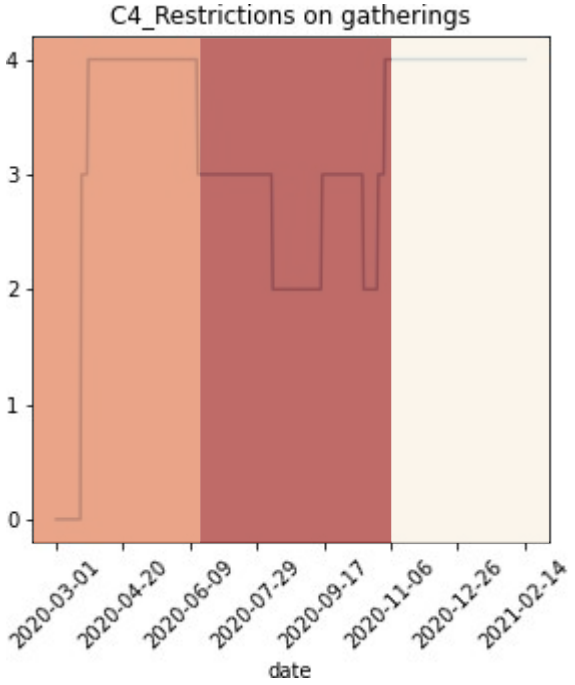
UV Index

“Equipopulated”



UV Index Over Time





Task 4

Corona vs Weather

OLS Regression Results

Dep. Variable:	hospitalized_addition	R-squared:	0.430
Model:	OLS	Adj. R-squared:	0.429
Method:	Least Squares	F-statistic:	89.98
Date:	Thu, 17 Feb 2022	Prob (F-statistic):	0.000398
Time:	15:05:19	Log-Likelihood:	-2206.1
No. Observations:	1760	AIC:	4420.
Df Residuals:	1756	BIC:	4442.
Df Model:	3		
Covariance Type:	cluster		

	coef	std err	t	P>|t|	[0.025	0.975]
const	3.5690	0.964	3.701	0.021	0.892	6.246
RelativeHumiditySurface	-0.0155	0.007	-2.081	0.106	-0.036	0.005
TemperatureAboveGround	-0.0107	0.016	-0.648	0.552	-0.056	0.035
UVIndex	-0.0550	0.010	-5.549	0.005	-0.083	-0.027

Omnibus:	1.037	Durbin-Watson:	1.614
Prob(Omnibus):	0.595	Jarque-Bera (JB):	0.956
Skew:	-0.001	Prob(JB):	0.620
Kurtosis:	3.114	Cond. No.	932.

Notes:
[1] Standard Errors are robust to cluster correlation (cluster)

Corona vs Weather + Govt

OLS Regression Results

Dep. Variable:	hospitalized_addition	R-squared:	0.570
Model:	OLS	Adj. R-squared:	0.568
Method:	Least Squares	F-statistic:	-4.855e+12
Date:	Thu, 17 Feb 2022	Prob (F-statistic):	1.00
Time:	15:06:32	Log-Likelihood:	-1957.1
No. Observations:	1760	AIC:	3938.
Df Residuals:	1748	BIC:	4004.
Df Model:	11		
Covariance Type:	cluster		

	coef	std err	t	P>|t|	[0.025	0.975]
const	2.4916	0.707	3.523	0.024	0.528	4.455
RelativeHumiditySurface	-0.0245	0.007	-3.556	0.024	-0.044	-0.005
TemperatureAboveGround	0.0260	0.015	1.688	0.167	-0.017	0.069
UVIndex	-0.0553	0.010	-5.552	0.005	-0.083	-0.028
C1_School closing	0.0989	0.048	2.068	0.107	-0.034	0.232
C2_Workplace closing	-0.8435	0.065	-13.001	0.000	-1.024	-0.663
C3_Cancel public events	1.5935	0.084	18.862	0.000	1.359	1.828
C4_Restrictions on gatherings	0.1828	0.066	2.774	0.050	-0.000	0.366
C5_Close public transport	0.3905	0.062	6.315	0.003	0.219	0.562
C6_Stay at home requirements	0.2511	0.151	1.664	0.171	-0.168	0.670
C7_Restrictions on internal movement	-0.0543	0.079	-0.689	0.529	-0.273	0.164
C8_International travel controls	-0.0191	0.023	-0.819	0.459	-0.084	0.046

Omnibus:	7.407	Durbin-Watson:	2.089
Prob(Omnibus):	0.025	Jarque-Bera (JB):	7.430
Skew:	0.146	Prob(JB):	0.0244
Kurtosis:	2.872	Cond. No.	1.17e+03

Notes:
[1] Standard Errors are robust to cluster correlation (cluster)
[2] The condition number is large, 1.17e+03. This might indicate that there are strong multicollinearity or other numerical problems.

Discussion

- Assumed intervention effects as linear
- Could have logged UV Index
- On the edge of significance
- Temporal lag probably not optimal