



23-29 June 2021

Interconnected Earth
System Impact:
A Comparative Analysis



How was the lockdown from up there?

a cross-country comparison in air quality

Watchword: patterns

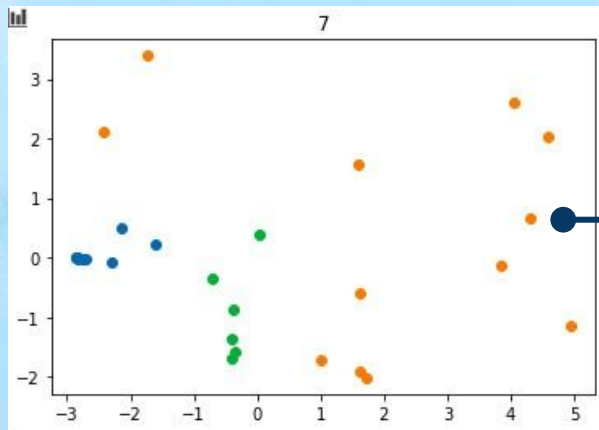
Data is nothing without patterns, and patterns are what we, as human beings, actually see and feel – and give meaning to.

Two complementary approaches:

- 1. An autoencoder architecture to reduce time series to a bunch of scalar values representing emission changes during a given period; such scalar values could then be used to differentiate between countries**
- 2. A country-specific time series study to understand the change in emission pattern during the pandemic.**

Space patterns

An autoencoder architecture reduces time series to a bunch of scalar values representing emission changes during a given period.

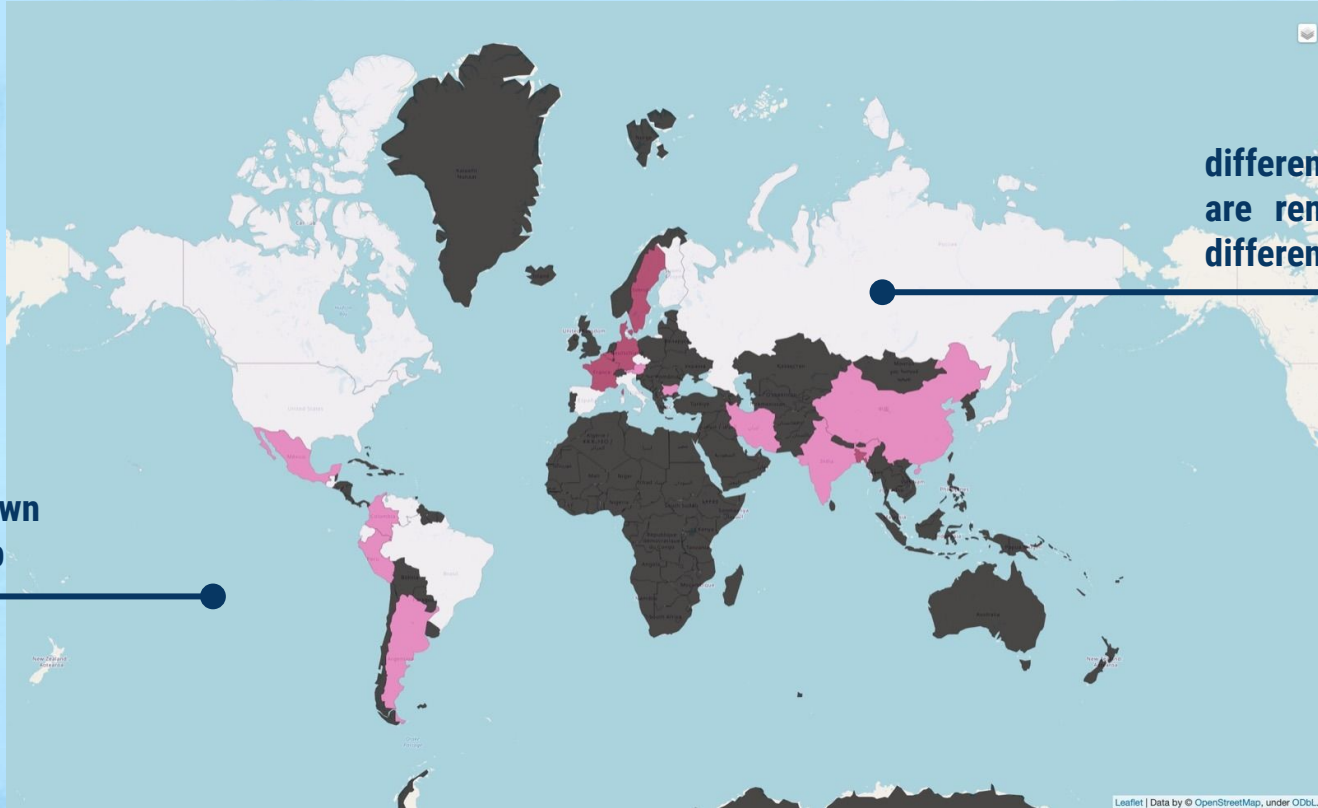


```
model = Sequential([Dense(inp_len, activation = 'relu'),  
Dense(100, activation = 'relu'),  
Dense(50, activation = 'relu'),  
Dense(25, activation = 'relu'),  
Dense(embedding_dimension, activation = 'relu', name = 'encoder'),  
Dense(25, activation = 'relu'),  
Dense(50, activation = 'relu'),  
Dense(100, activation = 'relu'),  
Dense(inp_len)])  
  
opt = tf.keras.optimizers.Adam(  
    learning_rate=0.001,  
    beta_1=0.9,  
    beta_2=0.999,  
    epsilon=1e-07,  
    amsgrad=False,  
    name="Adam")
```

A clustering algorithm classifies countries with respect to different emission patterns.

Space patterns: visualization

user is shown
a global map

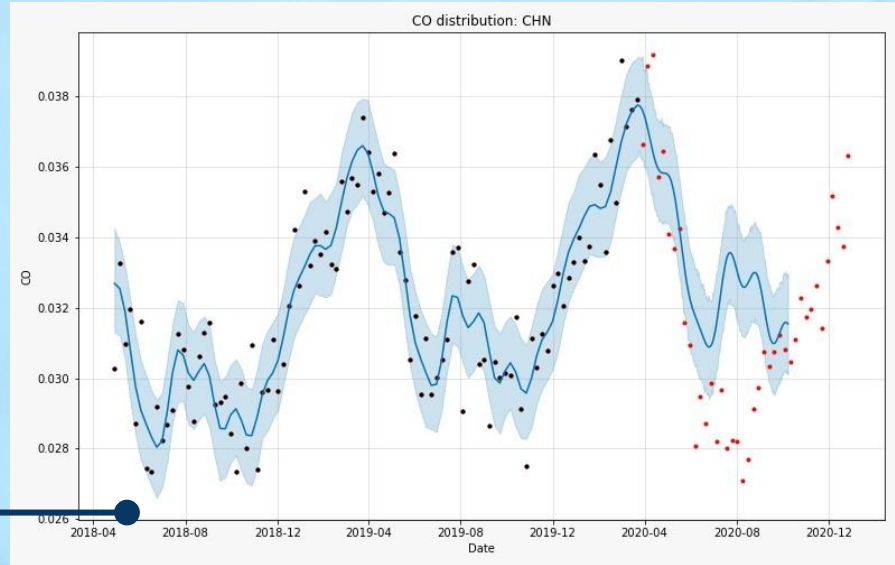


different clusters
are rendered by
different colors

Time patterns: analysis

Prophet was used to perform an analysis on time series.

Selecting a single country, we would extract the trend, both global and seasonal, in emissions from the pre-CoViD years, predict the trend for 2020 and then compare it to the observed data.



Time patterns: visualization

