EO DASHBOARD HACKATHON

23-29 June 2021

Interconnected Earth System Impact: A Comparative Analysis

ML JC

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.**

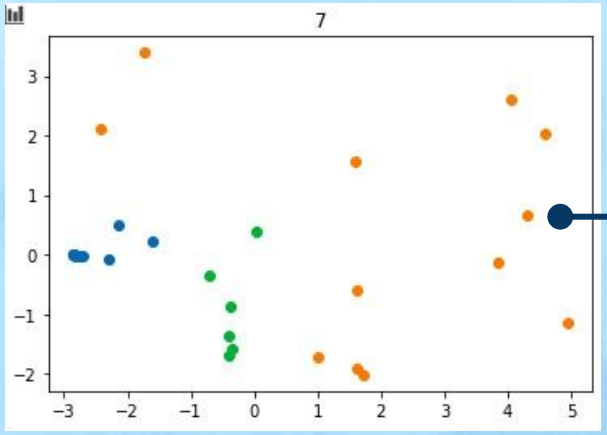
2. **A country-specific time series study to understand the change in emission pattern during the pandemic.**

Space patterns

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

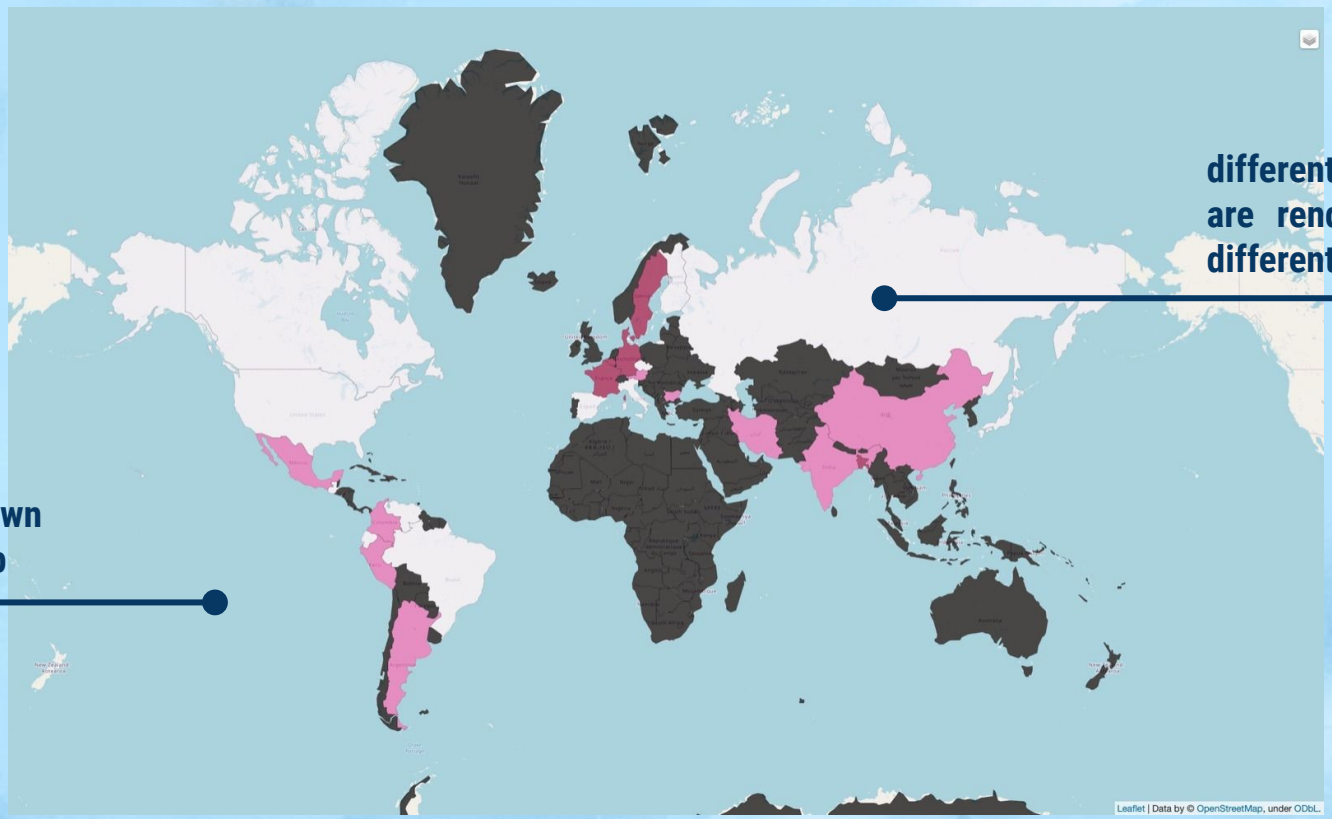
```
model = Sequential([Dense(inp_len, activation = 'relu'),
Dense(100, activation = 'relu'),
Dense(50, activation = 'relu'),
Dense(25, activation = 'relu'),
Dense(embedding_dimension, activation = 'relu', name = 'encoder'),
Dense(25, activation = 'relu'),
Dense(50, activation = 'relu'),
Dense(100, activation = '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.

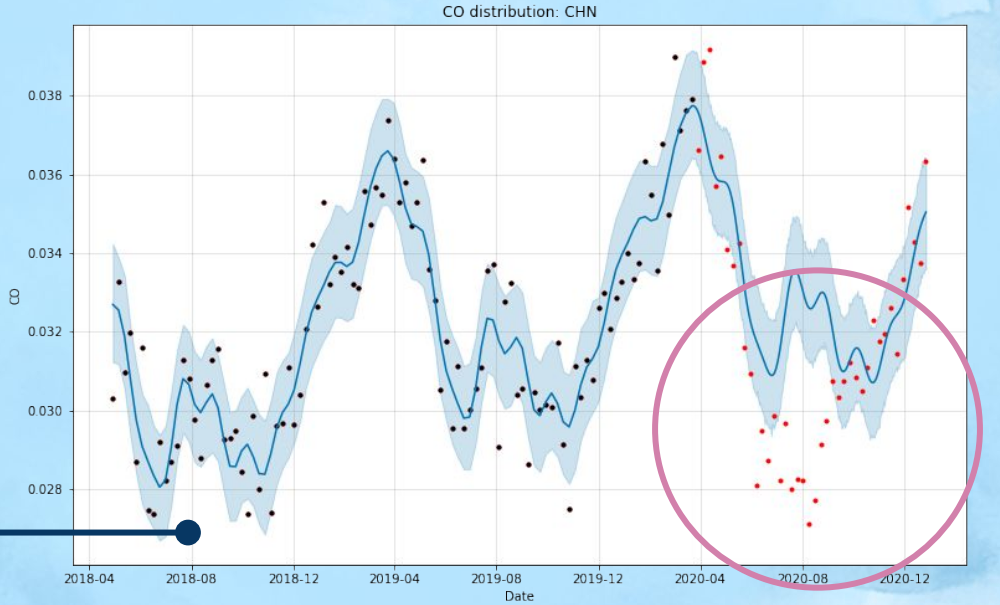
Space patterns: visualization



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