ANALYSIS OF CARBON MARKET CONTRIBUTIONS TO ACHIEVE CLIMATE GOALS

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TEAM 74

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01

What exactly are carbon credits?

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One carbon-credit represents

1 tonne

of carbon dioxide (CO_2)

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01
They are generated by

Reducing or removing emissions from the atmosphere:
to store carbon in trees using planting activities

02
Issued to

- Governments
- Industry
- To whoever wants it

03
To achieve

- Corporate Social Responsibility (CSR) objectives
- ‘neutral footprint’

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The Market

Regulatory

Generate Certified Emissions Reductions (CERs)

Voluntary

International credit accounting standards and generate Verified Emission Reductions (VERs)

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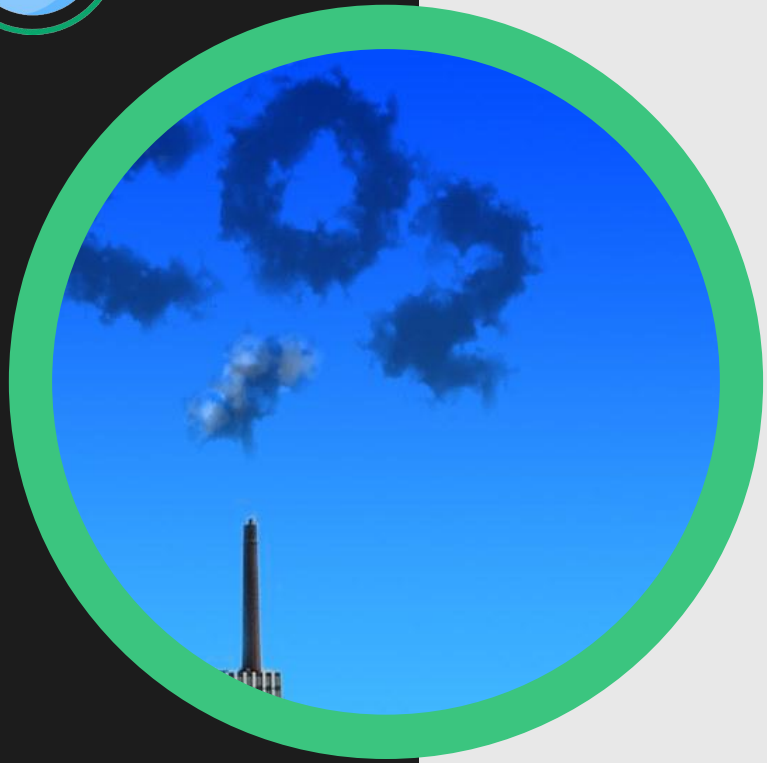

Analysis of voluntary market

Goal: Demonstrate corporate social responsibility and commitment to offsetting their emissions

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Is the generation of carbon credits from voluntary market changing the emissions' trajectory?

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What do we want to find out?

1. What is the behaviour of the CO2 emissions taking into account the carbon credits by country?
2. What will be the trend of the CO2 taking to account the carbon credits issued by country?
3. Are the carbon credits enough to reduce CO2 emissions? Which next steps can we take?

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How will we find it out?

1. To perform an Exploratory Data Analysis from trusted sources.
2. To propose and generate a mathematical model to predict the trend of CO2 emissions
3. To propose next steps to reduce CO2 emissions using carbon credits or propose other actions and alternatives

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THE PROCESS

What did we find in the data?

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The data

Berkeley

Voluntary Registry Offsets Database. Version 4 (2021): American Carbon Registry (ACR), Climate Action Reserve (CAR), Gold Standard, and Verra (VCS)

World Bank

CO2 emissions: total Greenhouse gasses emitted by country, since 1970 to 2018

Top 3 countries with more CO2 emitted by year

1.CHINA

169414160

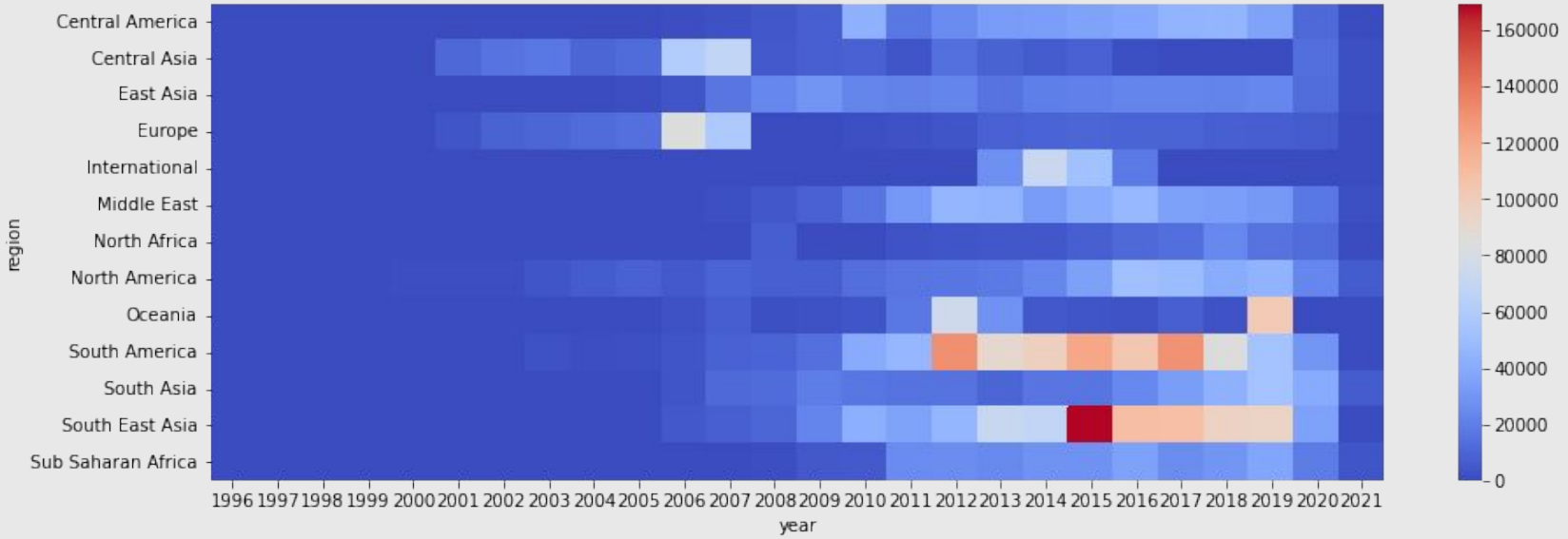
2.USA

153534870

3.RUSSIA

46892050

Total carbon credits issued by region



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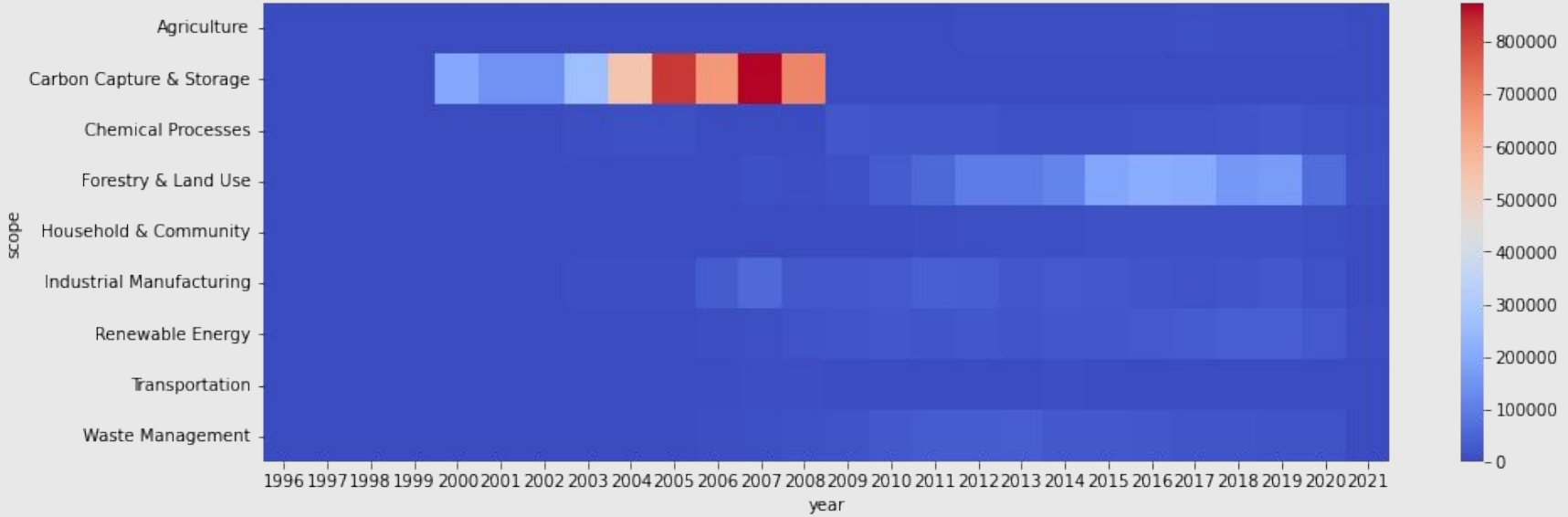
Total carbon credits issued by sector



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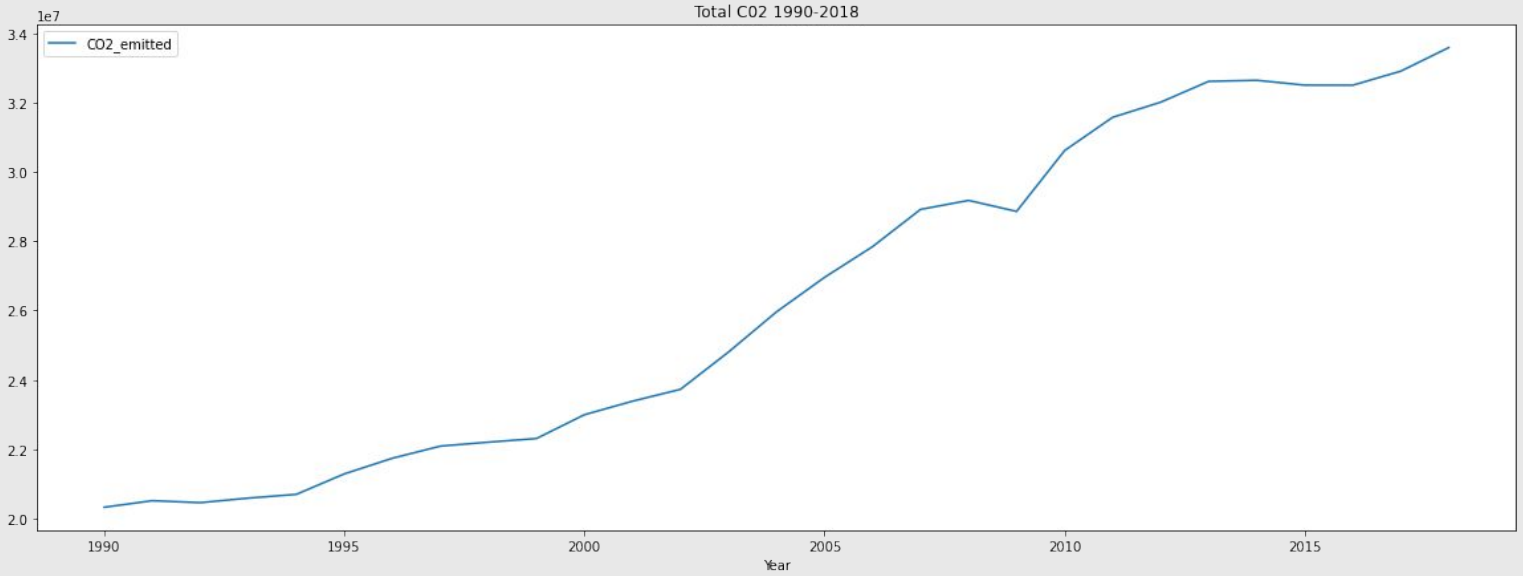
Total CO2 emitted by year



Analysis: CO2 emitted increases every year. The main points where there was an improvement are correlated with the years that other environmental agreements were made.

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Model Selection

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1. CNN LSTM

To predict the total CO2 emitted yearly

2. SVR

To predict the reduction of CO2 emitted

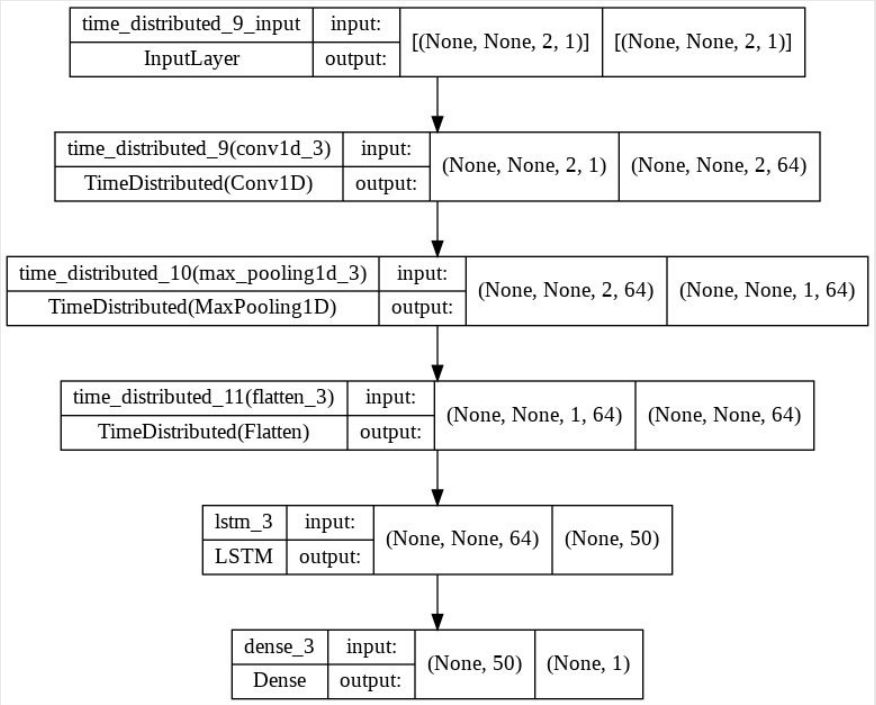
Projection of CO2 emitted yearly by CNN LSTM

1 Why did we use this model? To implement neural networks to predict time series.

2 How was it made?

Sequence: 4 periods
Subsequence: 2 periods
Feature: CO2 emitted
Used Keras sequential model adding each layer.
Parameters:

- Adam optimizer
- MSE loss function
- RMSE metric to compare with other models
- validation split of 10% (Due to the reduced amount of data available).



Model structure

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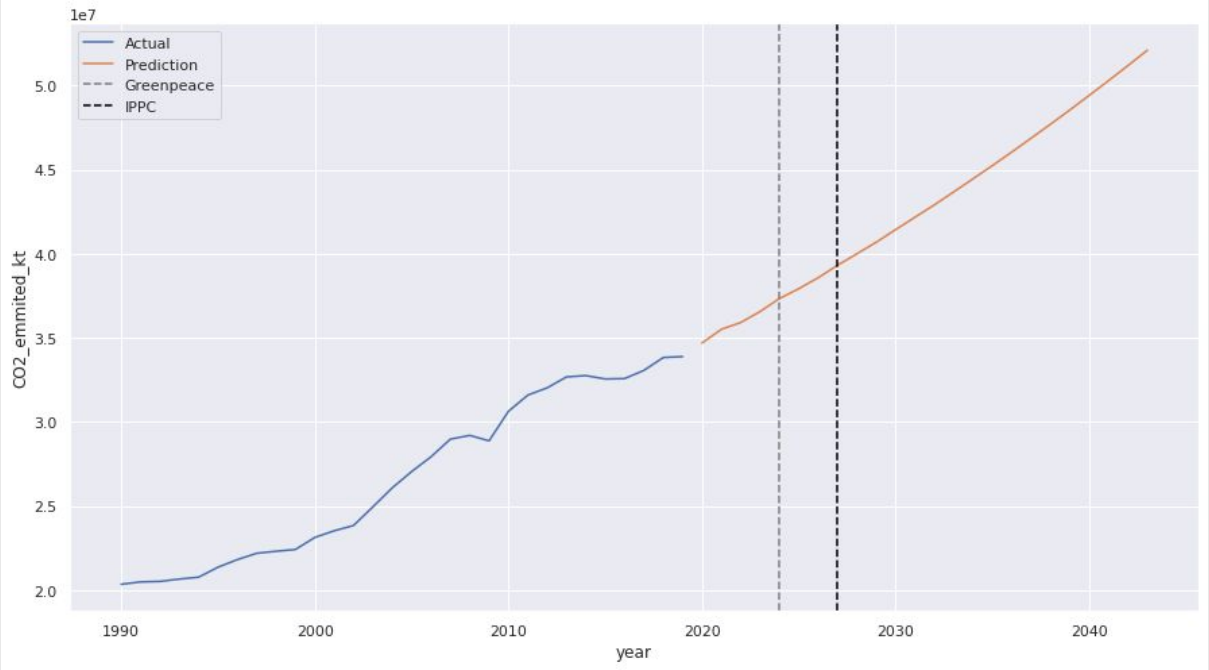
Projection of CO2 emitted yearly by CNN LSTM

3 Results

Greenpeace and WWF have a budget of 350 billions tons of accumulated CO2 left, IPCC and The Word Resource Institute have a budget of 485 billion tons left. If the projection is correct it be reach in 2024 and 2027 respectively.



Global projection

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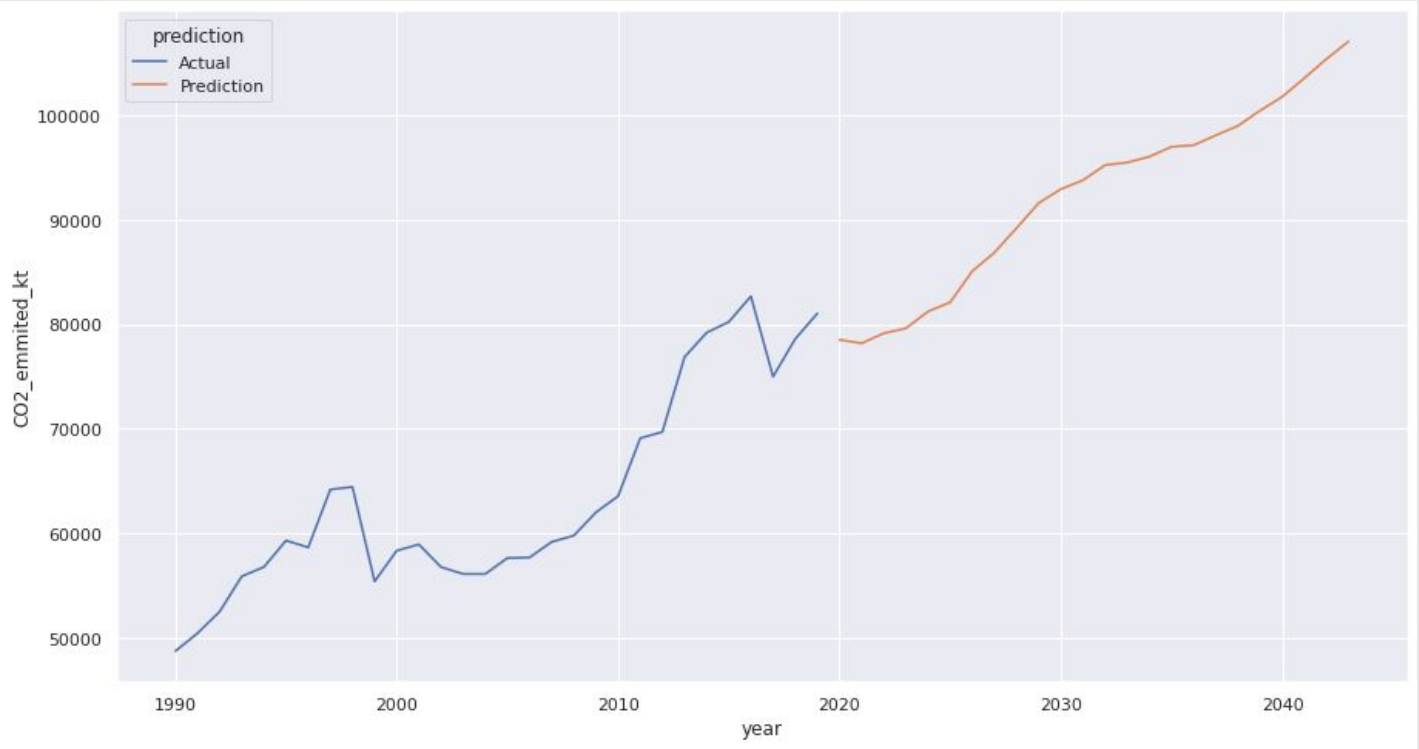
Projection of CO2 emitted yearly by CNN LSTM



Colombia projection

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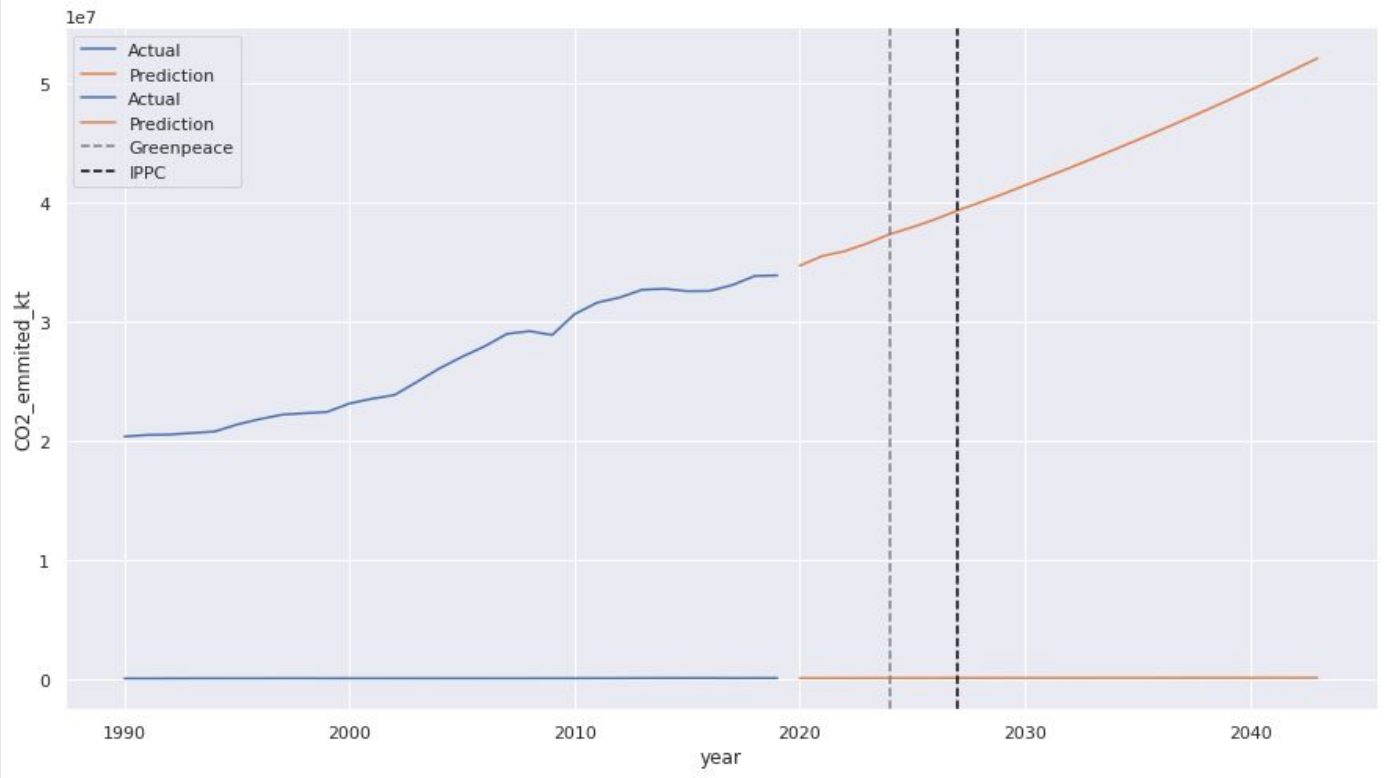
Projection of CO2 emitted yearly by CNN LSTM



Colombia vs global

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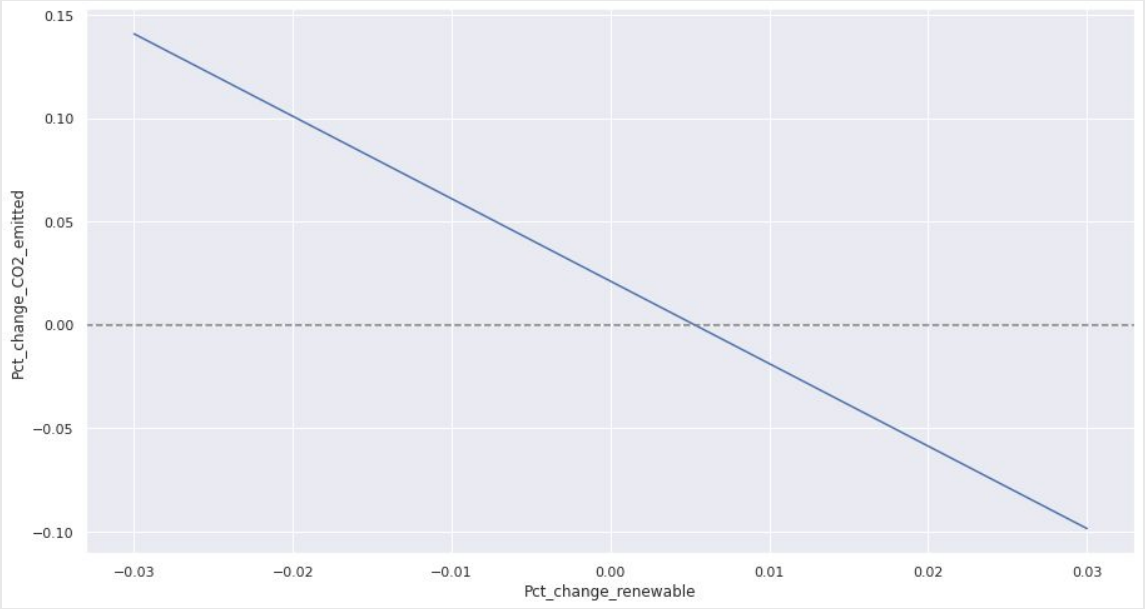
Support Vector Regressor

1. Why did we use this model? The SVR is a kind of support vector machine that creates an hyperplane to predict the target.

2. How was it made? The results?

   First we try to predict the reduction of CO2 with the amount of credits issued, but the correlation between these values was almost zero, then we use the variation of the % of fossil energies to predict the variation of the % of CO2 emitted.



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Even after over 20 years of the beginning of the credit market, there is no evidence of decreasing projection in terms of minimizing the impact of the emission levels generated and projected in the following 3 years

Main Conclusion

Conclusions

3rd Analysis

Simulate future trends using the existing data of emissions observed (1992 - 2018)

Cases

United States, China and Ukraine

The effectiveness

of Carbon Credits

Conclusions

Take into account economic variables

Motivation for private sector

Environmental Integrity

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IT WAS AMAZING!