

Traffic vs NO₂ Concentration

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Introduction

Nitrogen dioxide, otherwise known in its chemical formula NO₂, is a dangerous gas that is formed from the emissions of burning fossil fuels. Using data from a weather stations, its possible to see whether patterns in traffic can account for changes in the concentration of NO₂ in the air. So, the question stands, would reducing the amount of traffic such as in the year 2020, reduce the concentration of NO₂ in the air?

Methods

To check whether there is a correlation between the number of cars and the concentration of NO₂ in the air, a regression model needs to be made.

As a regression model is not enough to see whether there is a correlation, two boxplots and a violin plot were created to further analyze if traffic does indeed correlate with NO₂ concentrations.

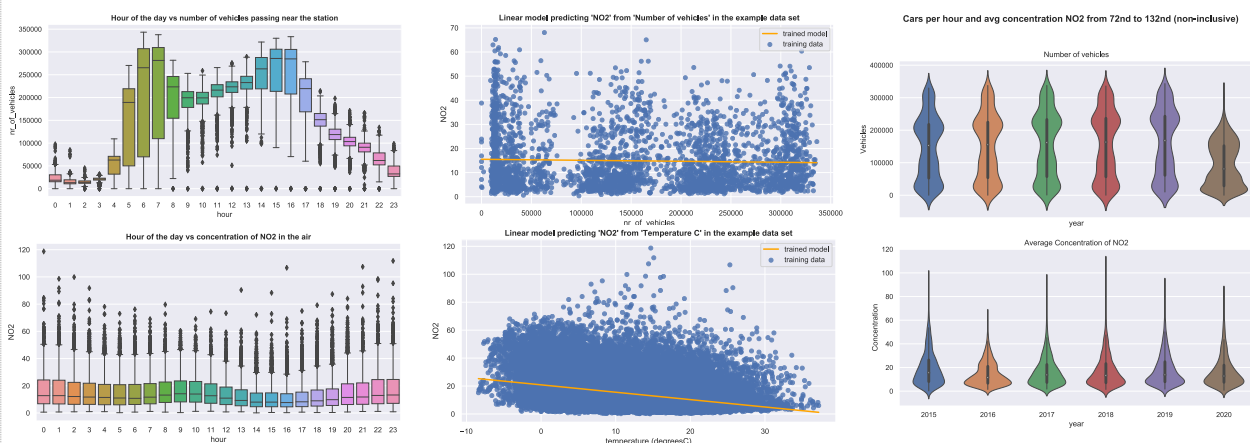
Results

Looking at the various graphs presented below, starting with the boxplots, its obvious that the average concentration of NO₂ in the air stays constant throughout every hour even though the number of cars peaks during the rush hours of the day.

This is further supported by the regression model of number of vehicles on NO₂ concentration as the R² value was 0.15.

Furthermore, it is evident in the violin plots that even in a period with reduced vehicle activities such as 2020 the concentration of NO₂ remains as constant as in previous years.

Lastly, since no correlation was found between traffic and NO₂ concentrations, testing for correlations between weather and NO₂ concentrations found a slightly stronger correlation.



Discussion

A possible weakness of the graphs is that the weather station that produced the data could be near an industrial area and because of lockdown, less vehicles were using roads but the NO₂ pollution was still being created by factories. It is also possible that there is a correlation between some weather patterns and NO₂ levels that can be found with further data analysis.

Conclusion

Based on the results presented in the graphs and plots, there is no evident correlation between the number of cars counted by the weather station and the concentration of NO₂ in the air. This is presented in various forms ranging from hours of the day to years. A possible factor that has come up as a byproduct of this investigation is the possibility of weather patterns having some effect on the amount of NO₂ in the air.