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| Big Data Programming Project – 5011 CEM |
| Low Level O3 Concentration Study |
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# Introduction

The ambit of this project was the visualization of the data set provided. Therefore, there was a need for the creation of pictures or figures that could illustrate the different data points in that data set.

Knowing what the data was and what it represented the answer as obvious, the plot of the same data should be over the map of Europe, and to make the visualization easier there should be the delimitation of the countries, coastlines and seas. What overs the map is a color variance according to the numbers encountered in the data set.

To calculate better and verify the changes between each model provided it was also required to calculate the mean concentration of low level O3 daily on a mean position of Portugal, a bar chart was then generated to represent these models’ differences in values.

# Specification

# Code

The code was separated into two main points of focus, visualization and comparison.

Starting with the visualization the models are separated in different NetCDF files, each one contains a 3-dimensional matrix with a latitude, longitude and time variables, the value contained in each position of the 3D matrix is the value of the O3 concentration on that geographic position at that given time. So, after extracting these variables from the file, we start building our map, setting green for land, red for cities, the coastlines as black lines and the rivers in blue. To extract a mean out of the 3D matrix it is turned into a 2D matrix with the mean() function, it basically creates a mean for each point by using the third column in the matrix which is the time. Now we just need to plot the data as we find it in the matrix. Being X our longitude and Y our latitude we plot the new 2D matrix variable having each X and Y being colored on the map. It uses a color grading from blue to yellow has the concertation increases.

On the comparison code there was the need of joining each model on the same bar chart, so for each model a code was created that would take a latitude and longitude of three points in Portugal, one in the North, one in the South and one in the Centre. Then we loop through the longitude and latitude to try and find the correct indexes for the values per part of Portugal. We also loop through the 25 possible hours to create the mean per hours in those positions. Then a mean of the 3 positions is calculated and we get the mean concentration of O3 in Portugal. By joining all of the models code we just plot it on a bar chart with each respective model in the label.

In general both codes work as supposed, there were no matters left to address and therefore, no extra code creation would be required.

# Results and Conditions

# Future Work

# Summary