



POLYTECHNIQUE  
MONTRÉAL

LE GÉNIE  
EN PREMIÈRE CLASSE

# Guide TP4

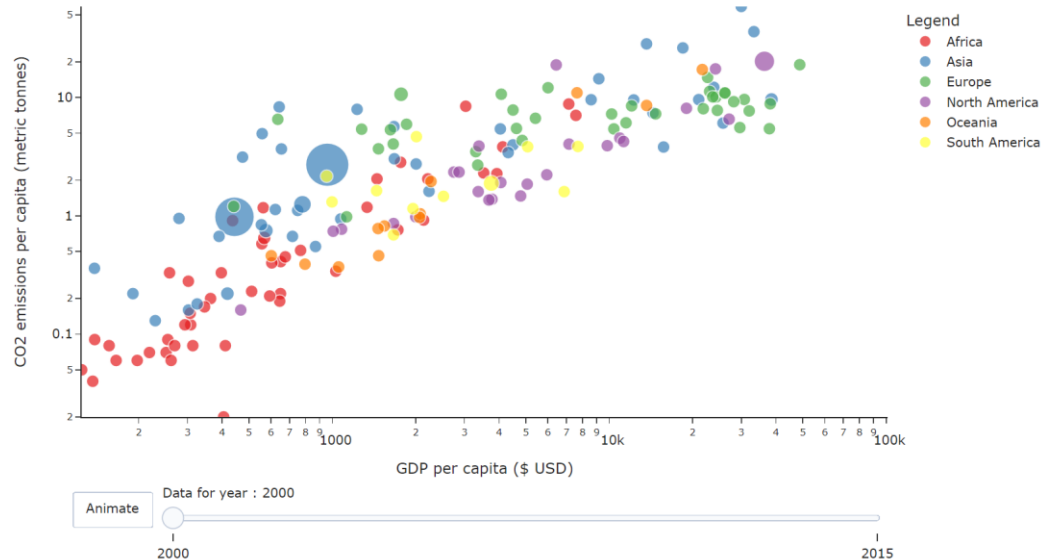
Version Python

# Objectives

- The objective of this practical work is to create an interactive bubble chart.

## GDP vs. CO2 emissions

In countries around the world



# Data

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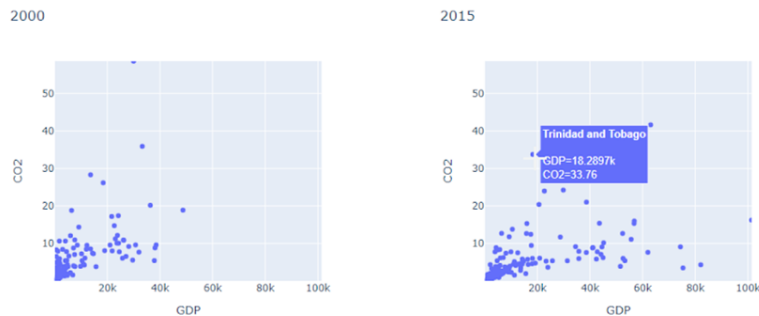
## *GDP and CO2 emissions*

- The dataset contains an array of objects for the years 2000 and 2015.
- Each object contains the following keys:
  - **Country Name** : The name of the country.
  - **GDP** : The GDP per capita in current U.S. dollars.
  - **CO2** : The CO2 emissions per capita in metric tonnes.
  - **Population** : The population of the country.
  - **Continent** : The continent of the country.

# Data Exploration

## Create point clouds

- For this part, use the Jupyter notebook provided with this assignment
- You will implement the code to create scatterplots for the 2000 and 2015 data
- These graphs will be displayed in an interactive Dash application
- Specific guidelines for the scatterplots are contained in the Jupyter notebook



Trinidad and Tobago

	GDP per capita (\$ USD)	CO2 emissions per capita (metric tonnes)
2000	6435.16	18.81
2015	18289.7	33.76

# Data Exploration

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## *Create point clouds*

- On this part you will have to use advanced Dash callbacks.
- **dash.callback\_context**
- Please read more here: <https://dash.plotly.com/advanced-callbacks>  
section: *Determining which Input Has Fired with dash.callback\_context*

# Data pre-processing

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*Rearrange some parts so that they can be properly used by Plotly*

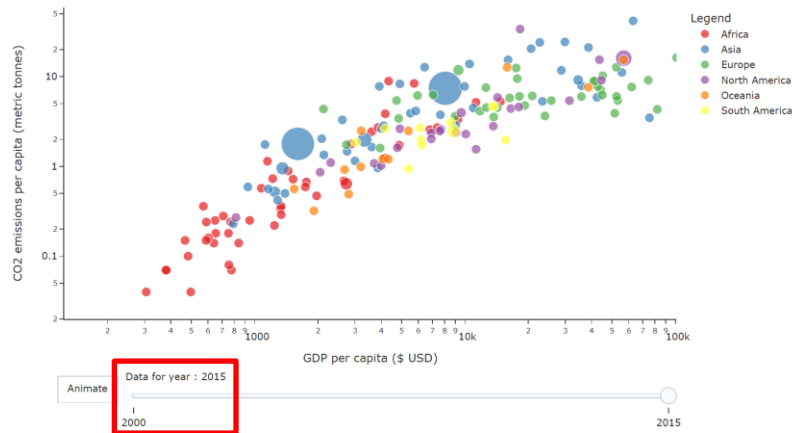
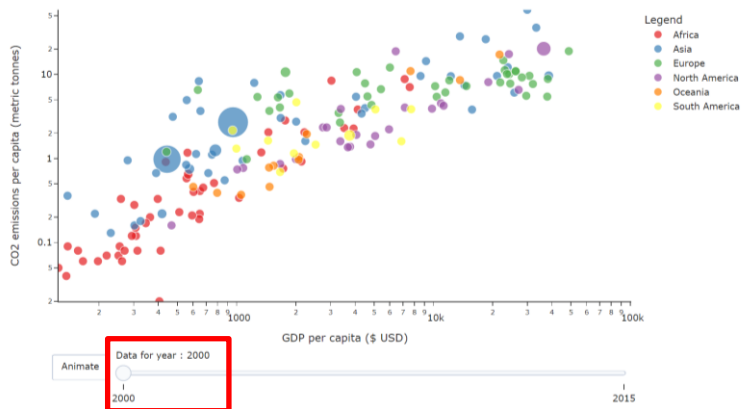
- Round the numbers in the data down so that they have fewer decimal places to display - **'round\_decimals'** function. \*
- Get the range of possible values for the x and y axis - **'get\_range'** function. \*
- Combine the data into a structure that is more easily readable by Plotly - function **'combine\_dfs'**.
- Sort data by year and continent to simplify display - **'sort\_dy\_by\_yr\_continent'** function

*\* You can reuse some of your code from your notebook for this step.*

# Animated bubble chart

*Generate the bubble chart with an animation opposite the year*

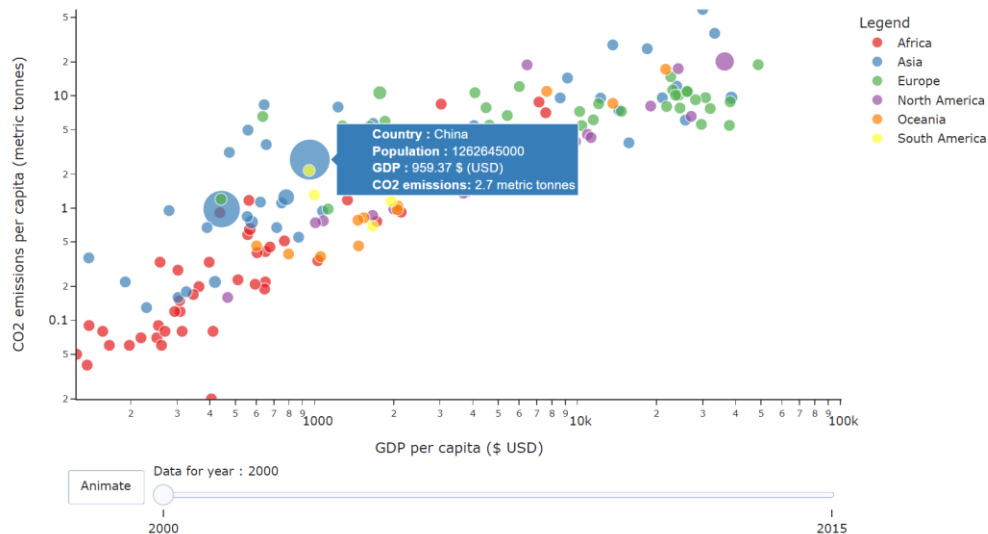
- Draw the animated bubble chart - '**get\_plot**' function. \* You can reuse some of your code from your notebook for this step.
- Update the hover template so that it appears on all frames of the animation - function '**update\_animation\_hover\_template**'.
- Simplify the animation menu display - '**update\_animation\_menu**' function
- Update some visual elements of the figure, such as axis labels, template and legend - '**update\_axes\_labels**', '**update\_template**' and '**update\_legend**' functions



# Tooltip

## *Implement the tooltip*

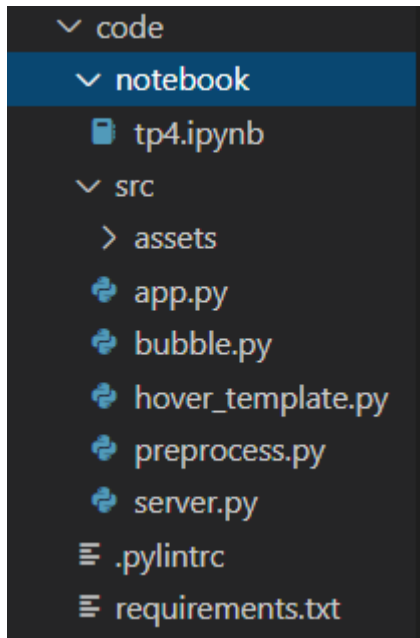
- The tooltip should contain the country name, population, GDP per capita and CO2 emissions per capita, in that order
- The whole code of this section can be written in the '**get bubble hover template**' function





# General Info

## File Structure



- Create *venv* and install *requirements.txt*
- You don't need to modify the files ***app.py*** and ***server.py***
- You must fill all the **TODO's** on the other files.