Context

This assessment will examine the student's understanding of the visualization theories and the ability to apply their knowledge into practice in order to utilize the visualisation to extract intelligence carrying out the Visual Analytic process.

Topic: What can we do about GHG/CO2 emissions?

Background:

The emission of greenhouse gases (GHGs) is widely recognized as a factor with potentially significant repercussions for the global environment. Consequently, numerous nations have undertaken concerted efforts to mitigate these emissions through the implementation of a range of policy measures. These policies exhibit a dual influence, exerting a direct impact on diverse sectors, including but not limited to industries such as mining, and exerting an indirect influence on various socioeconomic parameters, including Gross Domestic Product (GDP) and population demographics. It is noteworthy that the effectiveness of such policies varies among countries, resulting in divergent trends in GHG emissions. While some nations have witnessed the successful implementation of policies leading to a demonstrable reduction in GHG emissions, others may find themselves navigating a trajectory marked by an ascent in such emissions.

This assignment seeks to elicit your ability to address inquiries regarding the strategies adopted by different countries to combat the challenge of reducing GHG emissions. To achieve this, the assignment tasks you with demonstrating proficiency in the use of interactive visualizations or a series thereof to assist the Visual Analytic process.

Data:

In this assignment, a data set containing many GHG/CO2 emission data from the International Energy Agency (iea.org). The dataset provided (as a part of this assessment) contains the following highlights data for many countries and regions covering the period 1971 - 2022:

- GHG emissions from Energy (total)
- GHG fugitive emissions (total)
- GHG emissions from fuel combustion

  - Total
  - Coal
  - Oil
  - Gas

- GHG emissions from international

  - Marine bunkers
  - aviation bunkers

- CO2 emissions/TES
- CO2 emissions/GDP using exchange rates

- CO2 emissions/GDP using purchasing power parties
- CO2 emissions/population

You can download this data and the associated document from . (Assignment 2, GHG emission data for Assignment 2)

Tasks:

This assignment consists of two assessment components 1) group tasks (40% of the final mark), and 2) individual tasks (20% of the final mark).

Group tasks: (max 8 pages) (40 points)

Each group needs to produce the following as a part of the group task:

1. The main purpose of this group Visual Analytic task is to :
   1. Visually find groups of similar countries (not regions) with respect to their twelve attributes mentioned in the "Data" section describing GHG/CO2 emissions and various socioeconomic measures over 1971 – 2022.
   2. Visually find groups of similar countries whose "trend" in GHG/CO2 emission with respect to various socioeconomic measures over the observed years.
   3. Select one country to analyse, and identify the year (Year_1) which had minimum GHG/CO2 emission and the year (Year_2), which had maximum GHG/CO2 emission. Then, by using your interactive visualisation, find a "plan" to gradually improve various measures (such as GHG from Coal, CO2/GDP, etc.) selected country's profile from Year_2's profile to Year_1's profile.

2. To find the answers to the above three questions, you need to produce:
   1. Interactive Visualization (or multiple visualizations) that allows you to "see" the pieces of information that lead to the answers to the above three questions 1-a/b/c.
   2. Explain how your interactive visualisation has been evaluated and what sort of changes/modifications were applied to derive your final interactive visualisation.
   3. For each Visualization, provide the group's justification on how the visualization is produced, such as
      1. Why certain axes arrangement(s) was(were) used and how they would help to see the information you would need to see,
      2. Why certain visual variables were used and how they would help to see the information you would need to see,
      3. Why certain interaction was used and how that would assist analytic processes.

NOTE: You can use tools of your choice such as Tableau, PowerBI or even your own visualization program using a library like Matplotlib (Python), and D3J (JavaScript).

Submission:

The group report should be submitted with the cover sheet. The cover sheet will not be counted towards the 8-page limit. Write your report (up to 8 pages) using the template. We use this format and set the maximum page number in order to make the amount of work presented and processed by the markers consistent across all students.

Use this Canvas site to submit your report in the form of a PDF file, so that it can be checked using Turnitin.

You also need to submit maximum 10 min long movie file (.mov or .mp4) to demonstrate your interactive visualisation enabling finding the answers to the questions.

Academic integrity

While the University is aware that the vast majority of students and staff act ethically and honestly, it is opposed to and will not tolerate academic integrity breaches and will treat all allegations seriously.

Further information on academic integrity, and the resources available to all students can be found on the academic integrity pages on the current students website: https://sydney.edu.au/students/academic-integrity.html.

We use Turnitin, which includes AI detection, to detect potential instances of plagiarism or other forms of academic integrity breach. If such matches indicate evidence of plagiarism or other forms of academic integrity breaches, your teacher is required to report your work for further investigation.

You may only use artificial intelligence and writing assistance tools in assessment tasks if you are permitted to by your unit coordinator, and if you do use them, you must also acknowledge this in your work, either in a footnote or an acknowledgement section.

Further information for on research integrity and ethics for postgraduate research students and students undertaking research-focussed coursework such as Honours and capstone research projects can be also be found on the current students website: https://sydney.edu.au/students/research-integrity-ethics.html.

Compliance statement

In submitting this work, I acknowledge I have understood the following:

- I have read and understood the University of Sydney's Academic Integrity Policy 2022.
- The work is substantially my own and where any parts of this work are not my own I have indicated this by acknowledging the source of those parts of the work and enclosed any quoted text in quotation marks.

- I have acknowledged any assistance provided in preparing the work including the use of copy-editing, proof-reading, and automated writing and drawing tools (including artificial intelligence (AI), reference generators, translation software, grammar checkers, but not spell checkers).
- The work has not previously been submitted in part or in full for assessment in another unit unless I have been given permission by my unit of study coordinator to do so.
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- Engaging another person to complete part or all of the submitted work will, if detected, lead to the University commencing proceedings against me for potential student misconduct under the [University of Sydney (Student Discipline) Rule 2016](#).