Project 3: Team 21

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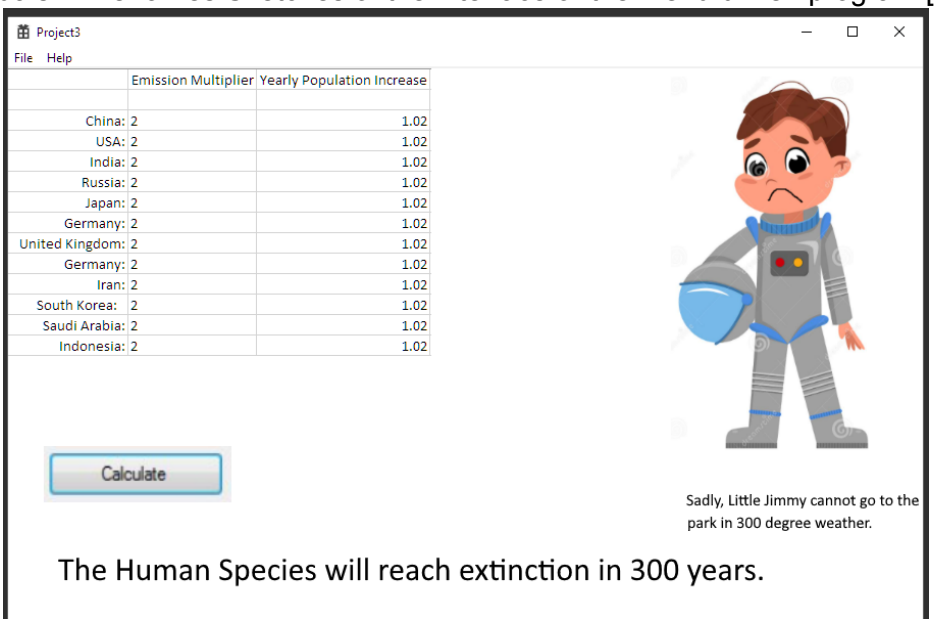
- Project Title: Mass Extinction Calculator
- Problem: What problem are we trying to solve? [0.50 point]
    - We are trying to collect data about CO2 emissions based in different countries and use that data to generate a model for the future. Using that model we can inform users of climate conditions many years into the future and give a rough prediction of when global warming may cause mass extinction to humanity.
- Motivation: Why is this a problem? [0.25 point]
    - Because global warming has such a powerful impact on our society, it is important to understand the timetable in which global warming will irreversibly affect the human race, our mass extinction event. In knowing how quickly this event arrives we can then properly establish a plan of action to act before catastrophe.
- Features: When do we know that we have solved the problem? [0.25 point]
    - The console will display if human civilization survives climate change, based on multiple values inputted by the user.
- Data: (Public data set we will be using and the link to the public data set) or (Schema of randomly generated data - i.e. what are the different columns in our dataset and the respective data types) [0.25 point]
    - The top 10 highest CO2 emission countries have these columns:
        - Yearly CO2 emissions per capita
        - Rate of Change of CO2 emissions
        - Population
        - Population growth per country for the last X years
        - Global Temperature
        - Number of half months from day 0
    - The dataset will be generated from provided values, and will be used for calculating the amount of time for extinction.
- Tools: Programming languages or any tools/frameworks we will be using [0.25 point]
    - C++ in Visual Studio for the provided GUI
- Visuals: Wireframes/Sketches of the interface or the menu driven program [0.50 points]



- Strategy: Preliminary Data Structures/Algorithms we may want to implement [0.50 points]
    - AVL BST
        - We will need the various operations an AVL tree needs to stay balanced so the rotations and a proper balancing algorithm are needed in order to properly implement an insertion. Removal wouldn't be necessary since the user shouldn't be removing any data. An inorder traversal may be required to retrieve data from a specific ID range in order or from the whole tree. We could format the ID in some manner so as to make adding a specific country and date work well in an AVL tree format.
    - Hash table
        - We would need some kind of hashing function to generate an ID from the data to be inserted. If the ID is already present, we can chain the data to the already present node. We would need a searching algorithm to find specific data as well as a range of data. It could be done so that the number to hash is in a certain format and the hashing function will chain together groups of data, so for example the chain only contains data from one country or one period of time.
- Distribution of Responsibility and Roles: Who is responsible for what? [0.50 points]
    - George will handle creating the data structures, the AVL tree and the Hashmap, and Dimitri handles the data set creation and its extrapolation using a prediction algorithm as well as an interface to access it. These roles could change based on how quickly or how slowly we may finish our respective parts.
- References
    - https://www.ucsusa.org/resources/each-countrys-share-co2-emissions
    - https://www.worldometers.info/world-population/population-by-country/
    - https://en.wikipedia.org/wiki/List_of_countries_by_carbon_dioxide_emissions