**GROWTH OF WORLD POPULATION**

**AND FUTURE PREDICTION**

**Final Report**

**Algonquin College (2023 Winter)**

**Prepared by:**

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**Executive Summary**

* **Project Title: Growth of World Population and Future Prediction**
* **Group Members:**

Student 1: April Fang

Student 2: Harsh Mistry

Student 3: Kiran Walia

Student 4: Paras Panchal (Team Leader)

* **Purpose:**

To gain a better understanding of the trends and patterns of human populations over time, what the potential implications of these changes may be, and make a future prediction to get prepared for the potential impacts of these changes.

**Dataset Description**

In this project, we use a dataset from the website of United Nations to represent the growth of world population and future prediction [1].

The dataset contains information about the growth of the world population from the year 1950 to 2021 and provides predictions for future years up to 2100. The data includes the total population for each year, as well as demographic information such as age distribution, growth rates, and fertility rates.

The dataset consists of 38250 of rows and 26 of columns, with each row representing a year and each column representing a specific variable. The columns include:

**Year:** The year for which the data is recorded.

**Total Population:** The total number of people living in the world in that year.

**Age Distribution:** The total number of the population that falls into different age groups (e.g., 0-5, 6-14, 15-24, 24-64, 65+).

**Births Actual:** The total number of births in the world in that year.

**Deaths Actual:** The total number of deaths in the world in that year.

**Growth Rates:** The percentage change in population size in the world in that year.

**Fertility Rates:** The number of children born to women of childbearing age (typically defined as ages 15-49) in that year.

**Growth Rate with Migration:** The percentage change in population size in that year that is attributed to both natural population growth (births minus deaths) and net migration.

**Growth Rate without Migration:** The percentage change in population size size in that year that is solely attributed to natural population growth (births minus deaths), excluding the impact of migration.

The dataset may also include information about specific countries or regions, allowing for analysis of population trends and predictions on a more localized level.

**Background**

The growth of the world population and future prediction is a topic of significant global interest, as the world's population has been increasing rapidly in recent decades, and is expected to continue growing in the future. The United Nations estimates that the world's population will reach 9.7 billion by 2050 and 11.2 billion by 2100.

The study of population growth and prediction is an interdisciplinary field that draws upon a variety of disciplines, including demography, economics, sociology, and environmental science. Researchers in this field seek to understand the causes and consequences of population growth, as well as the factors that affect population trends, such as fertility rates, mortality rates, migration patterns, and access to education and healthcare.

The implications of population growth are significant, as it places pressure on resources such as food, water, and energy, and contributes to environmental degradation and climate change. As a result, researchers and policymakers are increasingly focused on promoting sustainable development and implementing policies that encourage sustainable consumption and production.

In recent years, advances in data collection and analysis have made it possible to develop more accurate models for predicting population growth. These models can help policymakers to anticipate future population trends and develop strategies for addressing the challenges posed by population growth.

Overall, the study of population growth and future prediction is a critical area of research, as it provides insights into the social, economic, and environmental challenges facing the world today, and offers a path towards a more sustainable future.

**Analysis**

* **Questions Addressed:**

1. When and why did the world population grow?
2. How does rapid population growth come to an end?
3. How is the global population distributed across the world?
4. Which countries are most densely populated?
5. How many people die and how many are born each year?
6. How does migration affect country populations?

* **Data Preparation:**

1. Download dataset from the website of the United Nations.
2. Check the data to see if there is any missing data, noisy data, bad cables, wrong data types, outliers, etc., and clean the data by removing any errors or inconsistencies.
3. Calculate Growth Rates, Absolute Change Values and Relative Change Rates in population over time by using Birth Rates, Death Rates , etc., and identify trends and patterns in population growth.

* **Data Visualization:**

1. Use visualization tools in Power BI to explore the data and identify trends, such as charts, graphs, and maps [2].
2. Birth rate vs death rate
3. Annual number of deaths by region
4. Annual number of births by region
5. Population by age group
6. Annual population growth
7. Life expectancy
8. Fertility rate
9. Population growth by level of development
10. Population density
11. Population distribution
12. Growth WRT migration
13. In the end - dataset comparison on UN and US census bureau 2017

* **Data Analysis:**

1. Fertility rates: Fertility rates have the significant impact on population growth. From the trends of charts, countries with higher fertility rates experience faster population growth, while countries with lower fertility rates experience slower growth.
2. Age structure: From the patterns of charts, countries with a higher proportion of young people grow faster in population size, while countries with an aging population grow slower in population size.
3. Historical trends: The existed patterns and trends in population growth from historical data is used to make future predictions that that the world population will reach 9.7 billion by 2050 and 10.9 billion by 2100.
4. Migration: As people move from one place to another, this can include internal migration within a country or international migration between countries. Migration can also be influenced by factors such as political instability, economic opportunities, and social networks.

**Conclusion & Recommendations**

The world population has grown exponentially over the past century, from around 1.6 billion in 1900 to over 7.9 billion in 2021. The future prediction of world population growth is subject to various uncertainties, including changes in fertility rates, migration patterns, and mortality rates. However, this population dataset suggests that the world population will continue to grow for the next few decades, albeit at a slower rate than in the past. It is predicted that the world population will reach 9.7 billion by 2050 and 10.9 billion by 2100. This growth presents several challenges, including pressure on resources such as food, water, and energy, as well as environmental degradation and climate change.

To address these challenges, it is important to focus on sustainable development and implement policies that encourage sustainable consumption and production. This includes investing in renewable energy sources, promoting education and access to family planning, and implementing policies that promote the reduction of greenhouse gas emissions.

Additionally, efforts must be made to address the inequalities in resource distribution, which exacerbate the challenges posed by population growth. Policies that promote social and economic development, reduce poverty, and improve access to basic services such as health care and education can help to reduce inequalities and promote a more sustainable future.

In conclusion, while population growth poses significant challenges, it also presents opportunities for innovation and progress. By implementing sustainable development policies and addressing inequalities, we can work towards a more equitable and sustainable future for all.

**References**

[1]

United Nations, “World Population Prospects - Population Division - United Nations,” *un.org*, 2022. <https://population.un.org/wpp/>

[2]

M. Roser, E. Ortiz-Ospina, H. Ritchie, and L. Rodés-Guirao, “World Population Growth,” *Our World in Data*, 2013. <https://ourworldindata.org/world-population-growth>

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Project (including the following)– 30 marks

Names of all Data sets submitted

* < birth-rate-vs-death-rate >
* < Life Expectancy >
* < World Population\_UN >
* < World Population\_UN\_2021 >

Data preparation techniques used

* Data cleaning: We worked as pairs to clean and analyze the dataset. It includes handling missing data, dealing with outliers, and correcting invalid values.
* Data integration: Paras combinied data from different sources using merge query to combine table in PowerBI.
* Data reduction: Paras reduced the amount of data to be analyzed, selected columns that are most relevant to our topic.
* Add columns: Paras created new columns from existing data, such as Absolute Change Values and Relative Change Rates. This help to improve trends and patterns.

How work has been divided amongst team members? Who did what?

April Fang

* Search Dataset: Searched dataset on pandemic topic
* Data Preparation: Cleaned one dataset of world population with Kiran
* Create Charts: Created 3 charts
* Create Dashboard: TBD
* Create Visualization: Used Filled Map visualization and Slicer, etc.
* Create Story: TBD
* Progress Presentation: Drafted the initial version and flled my progress
* Project File with Datasets: Provided my project files with my work
* Final Report: Finaliized the report based on existing files
* Final Presentation: TBD

Harsh Mistry

Kiran Walia

Paras Panchal

CRITERIAS TO BE ADDED IN FINAL PRESENTATION

Clear labelling of charts/dashboard/story/visualization

Interactivity

Story telling

Answer the problem statement