The Comprehensive Analysis of Global Population Trends and Patterns

Submitted

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I.PROBLEM STATEMENT

"Estimate and Analyze Trends in World Population Data"

This analysis aims to provide insights into demographic data on a worldwide scale. We have a dataset with data on a number of nations, including their 2022 population estimates, growth rates, and other pertinent measurements. The objective is to provide targeted answers and identify intriguing trends in the information.

- Highest Population Country: - Ascertain and present the nation with the largest population in 2022.
- Nation with Fastest Population Growth: - Determine and present the nation with the fastest rate of population growth.
- Countries with Extraordinary Populations: - Name the top three nations in terms of population in 2022. Define "extraordinary" according to the magnitude of the population.
- Most Densely Populated Country: - Determine and present the nation with the highest density of population, derived from dividing the total population by the area of its land.
- Summarize your findings and provide insights into the changes and trends observed in world population data. How might these trends impact policy decisions, urban planning, or future population projection

II.DATASET ANALYSIS

1. Global Population Trends:

The world population has experienced substantial growth, reaching 7.6 billion in 2019, and is estimated to surpass 8 billion by 2030. Notably, the population growth rate has steadily decreased since the 1970s.

2. Top Two Most Populous Countries:

China and India stand out as the most populous countries, each exceeding 1 billion people. China's population growth is projected to decline, while India is anticipated to become the world's most populous country by 2030.

3. Impact of Specific Countries on Global Growth:

The population growth of the Democratic Republic of the Congo, Ethiopia, India, Indonesia, Nigeria, Pakistan, Uganda, Tanzania, and the United States will significantly contribute to the overall global population increase.

4. Projection and Challenges:

Projections indicate continued global population growth, exceeding 9 billion by 2040 and 10 billion by 2055. The challenge lies in managing this growth, with particular attention to the demographic shifts in Africa and the potential doubling of populations in some nations.

5. Historical Population Growth:

Examining the historical trends reveals a notable increase in global population from 7.2 billion in 2015 to 7.6 billion in 2019. The annual growth rate, while decreasing since the 1970s, remains significant.

6. Regional Population Dynamics: Population dynamics vary across regions. China and India lead in population size, but diverse growth patterns and projections exist globally, with variations in fertility rates and migration.

Dataset Glossary (Column-Wise)

Rank: Rank by Population.

CCA3: 3 Digit Country/Territories Code.

Country/Territories: Name of the Country/Territories.

Capital: Name of the Capital.

Continent: Name of the Continent.

2022 Population: Population of the Country/Territories in the year 2022.

2020 Population: Population of the Country/Territories in the year 2020.

2015 Population: Population of the Country/Territories in the year 2015.

2010 Population: Population of the Country/Territories in the year 2010.

2000 Population: Population of the Country/Territories in the year 2000.

1990 Population: Population of the Country/Territories in the year 1990.

1980 Population: Population of the Country/Territories in the year 1980.

1970 Population: Population of the Country/Territories in the year 1970.

Area (km^2): Area size of the Country/Territories in square kilometer.

Density (per km^2): Population Density per square kilometer.

Growth Rate: Population Growth Rate by Country/Territories.

World Population Percentage: The population percentage by each Country/Territories.

III.ENVIRONMENTAL SETUP

3.1. Python Installation

Ensure that Python installed on your system.

3.2. Package Installation

The code relies on several Python packages. install these packages using the package manager pip. Open a command prompt or terminal and run the following commands:

- pip install pandas
- pip install plotly
- pip install seaborn

These commands will install the required packages: Pandas for data manipulation, Plotly for interactive data visualization, and Seaborn for statistical data visualization.

3.3. Data File

The data file named 'world-population.csv' in the specified path as mentioned in the code ('/content/drive/MyDrive/Data-sets-qqpp/'). This CSV file should contain the necessary population data fo analysis.

3.4. Google Colab

Using Google Colab, ensure that have the data file in Google Drive

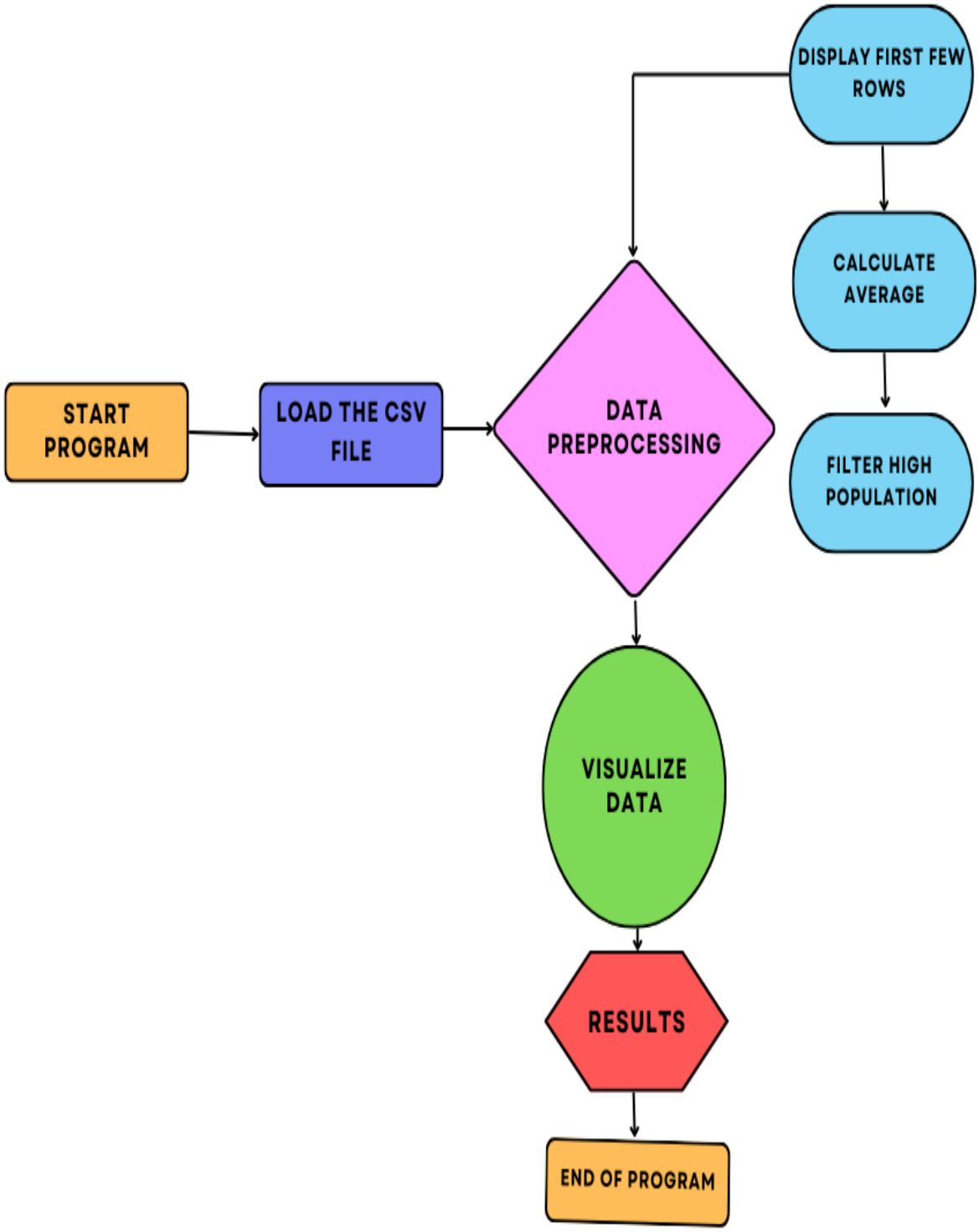
3.5. Google Drive

- File Storage: Google Drive provides a place to store various types of files, including documents, images, videos, and more.
- File Synchronization: we can install the Google Drive desktop application, which syncs your Google Drive files with your local computer, ensuring that your files are accessible and up to date across all your devices.
- Access Anywhere: Google Drive can be accessed from various devices, including computers, smartphones, and tablets, via web browsers and mobile apps.
- File Sharing: Users can easily share files and folders with others, setting permissions to control who can view, edit, or comment on the files.
- Collaboration: Google Drive is integrated with Google Docs, Google Sheets, and Google Slides, allowing for real-time collaboration on documents with multiple users.

3.6. Running the Code

Once environment is set up and the data file is available, execute the code provided in a Python environment or a Notebook. Run each code block to perform data analysis and create visualizations.

IV.DATA FLOW DIAGRAM



V.CODE SKELETON

```
import pandas as pd
# Assuming your dataset is in a CSV file named 'world_population.csv'
file_path = '/content/world_population.csv'
# Try reading the file with different encodings
encodings_to_try = ['utf-8', 'ISO-8859-1']
for encoding in encodings_to_try:
    try:
        # Load the dataset into a pandas DataFrame
        df = pd.read_csv(file_path, encoding=encoding)
        break  # Break out of the loop if successful
    except UnicodeDecodeError:
        print(f"Failed to read with encoding {encoding}")
# Calculate world population percentage change
df['World Population Percentage'] = df['2022 Population'].pct_change() * 100
# Display the first few rows of the dataset
print(df.head())
# Perform operations on the dataset
average_population = df[['2022 Population', '2020 Population', '2015 Population', '2010 Population', '2000 Population']].mean()
print("\nAverage Population for each year:")
print(average_population)
high_population_countries = df[df['2022 Population'] > 1000000000]
print("\nCountries with a population greater than 1 billion in 2022:")
print(high_population_countries[['Country/Territory', '2022 Population']])
# Additional operations on the dataset
highpop = df.loc[df['2022 Population'].idxmax()]
print("\nCountry with Highest Population:")
print(highpop)
leastpop = df.loc[df['2022 Population'].idxmin()]
print("\nCountry with Least Number of People:")
```

```
print(leastpop)
highgrow = df.loc[df['Growth Rate'].idxmax()]
print("\nCountry with Highest Population Growth:")
print(highgrow)
extapop = df.nlargest(3, '2022 Population')
print("\nExtraordinary Population Countries:")
print(extapop)
df['Density'] = df['2022 Population'] / df['Area']
den = df.loc[df['Density'].idxmax()]
print("\nMost Densely Populated Country:")
print(den)
# Create separate bar graphs
fig, axes = plt.subplots(2, 2, figsize=(12, 10))
# Bar graph for Country with Highest Population
axes[0, 0].bar(highpop['Country/Territory'], highpop['2022 Population'], color='blue')
axes[0, 0].set_title('Country with Highest Population')
axes[0, 0].set_ylabel('Growth rate')
# Bar graph for Country with Least Number of People
axes[0, 1].bar(leastpop['Country/Territory'], leastpop['2022 Population'], color='green')
axes[0, 1].set_title('Country with Least Number of People')
axes[0, 1].set_ylabel('Population')
# Bar graph for Country with Highest Population Growth
axes[1, 0].bar(highgrow['Country/Territory'], highgrow['Growth Rate'], color='red')
axes[1, 0].set_title('Country with Highest Population Growth')
axes[1, 0].set_ylabel('Growth Rate')
# Additional subplot for Extraordinary Population Countries
axes[1, 1].bar(extapop['Country/Territory'], extapop['2022 Population'], color='blue')
axes[1, 1].set_title('Extraordinary Population Countries')
axes[1, 1].set_ylabel('Population')
```

VI.RESULT ANALYSIS

1.Country with Highest Population:

Rank	1
CCA3	CHN
Country/Territory	China
Capital	Beijing
Continent	Asia
2022 Population	1425887337
2020 Population	1424929781
2015 Population	1393715448
2010 Population	1348191368
2000 Population	1264099069
1990 Population	1153704252
1980 Population	982372466
1970 Population	822534450
Area	9706961
Density	146.8933
Growth Rate	1.0
World Population Percentage	17.88

2.Country with Least Number of People:

Rank	234
CCA3	VAT
Country/Territory	Vatican City
Capital	Vatican City
Continent	Europe
2022 Population	510

2020 Population	520
2015 Population	564
2010 Population	596
2000 Population	651
1990 Population	700
1980 Population	733
1970 Population	752
Area	1
Density	510.0
Growth Rate	0.998
World Population Percentage	0.0

3.Country Witnessing Highest Population Growth:

Rank	135
CCA3	MDA
Country/Territory	Moldova
Capital	Chisinau
Continent	Europe
2022 Population	3272996
2020 Population	3084847
2015 Population	3277388
2010 Population	3678186
2000 Population	4251573
1990 Population	4480199
1980 Population	4103240
1970 Population	3711140
Area	33846
Density	96.7026

Growth Rate 1.0691

World Population Percentage 0.04

4.Extraordinary Population Countries:

Rank	CCA3	Country/Territory	Capital	Continent	2022 Population	2020 Population	2015 Population	2010 Population
41	CHN	China	Beijing	Asia	1425887337	1424929781	1393715448	1348191368
92	IND	India	New Delhi	Asia	1417173173	1396387127	1322866505	1240613620
221	USA	United States	Washington, D.C.	North America	338289857	335942003	324607776	311182845

	2000 Population	1990 Population	1980 Population	1970 Population	Area	Density	Growth Rate	World Population Percentage
41	1264099069	1153704252	982372466	822534450	9706961	146.8933	1.0000	17.88
92	1059633675	870452165	696828385	557501301	3287590	431.0675	1.0068	17.77
221	282398554	248083732	223140018	200328340	9372610	36.0935	1.0038	4.24

5.Most Densely Populated Country:

Rank 167

CCA3 MAC

Country/Territory	Macau
Capital	Concelho de Macau
Continent	Asia
2022 Population	695168
2020 Population	676283
2015 Population	615239
2010 Population	557297
2000 Population	431896
1990 Population	350227
1980 Population	245332
1970 Population	247284
Area	30
Density	23172.266667
Growth Rate	1.0125
World Population Percentage	0.01

6. Visualization of Most Densely Populated Country