Tracing the Growth of the Global Community: A Population Forecasting Analysis

PREPARED BY:

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CONTENT

Milestone 1: Define problem/ problem understanding

Activity 1: Specify the business problem

The world's population is more than three times larger than it was in the mid-twentieth century. The global human population reached 8.0 billion in mid-November 2022 from an estimated 2.5 billion people in 1950, adding 1 billion people since 2010 and 2 billion since 1998. The world's population is expected to increase by nearly 2 billion persons in the next 30 years, from the current 8 billion to 9.7 billion in 2050 and could peak at nearly 10.4 billion in the mid-2080s. This dramatic growth has been driven largely by increasing numbers of people surviving to reproductive age, the gradual increase in human lifespan, increasing urbanization, and accelerating migration. Major changes in fertility rate have accompanied this growth. These trends will have far-reaching implications for generations to come.

ACTIVITY 2: Business requirements

The business requirements for 'Tracing the growth of global community' includes

1) Accurate data on population growth and demographics for multiple countries and region:

"Demography is destiny" is an oft-cited phrase that suggests the size, growth, and structure of a nation's population determines its long-term social, economic, and political fabric. The phrase highlights the role of demographics in shaping many complex challenges and opportunities societies face, including several pertinent to economic growth and development.

Population growth

It took more than 50,000 years for world population to reach 1 billion people. Since 1960, we have added successive billions every one to two decades. The world population was 3 billion in 1960; it reached 6 billion around 2000, and the United Nations projects it will surpass 9 billion by 2037. The population growth rate has been slowing, however, from peak annual rates in excess of 2 percent in the late 1960s, to about 1 percent currently, to half that by 2050.

Age structure dynamics

The age structure of a population reflects mainly its fertility and mortality history. In high-mortality populations, improved survival tends to occur disproportionately among children. This effectively creates a baby boom. Eventually, the boom ends when fertility abates in response to perceptions of improved child survival and as desired fertility declines with economic development. But as the relatively large baby-boom cohorts proceed through adolescence and into their adult years, the population share at the peak ages for work and saving swells.

Global graying

Population aging is the dominant demographic trend of the twenty-first century—a reflection of increasing longevity, declining fertility, and the progression of large cohorts to older ages. Never before have such large numbers of people reached ages 65+ (the conventional old-age threshold). We expect to add 1 billion older individuals in the next three to four decades, atop the more than 700 million older people we

have today. Among the older population, the group aged 85+ is growing especially fast and is projected to surpass half a billion in the next 80 years. This trend is significant because the needs and capacities of the 85+ crowd tend to differ significantly from those of 65-to-84-year-olds.

The bottom line

Global, regional, and country demographic indicators have changed dramatically since the early 1950s and are poised for equally dramatic changes in the coming decades. Population aging continues to displace population growth as the focal point of interest among global demographic phenomena. Nonetheless, both phenomena and their underlying drivers have had, and will continue to have, profound repercussions for myriad indicators and determinants of economic well-being and progress. Demographics are not, however, set in stone. Nor are their implications for individual and collective well-being.

2) The ability to analyze and forecast population growth tends over a specific time period:

Exponential growth describes a hypothetical model for population growth in which space and resources are available in unlimited supply. As a result, the population growth rate increases with each new generation. Under this model, a population rapidly grows quite large, and continues to grow indefinitely:

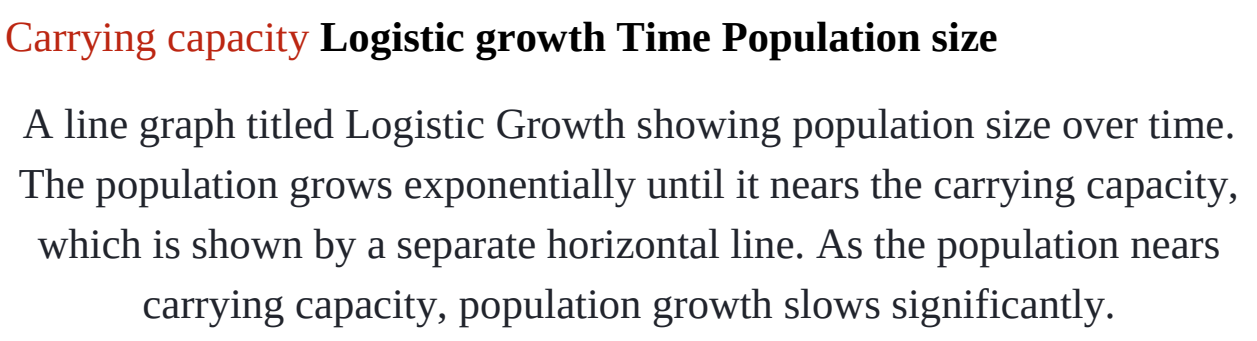
Exponential growth Time Population size

A line graph titled Exponential Growth showing population size over time. The line curves upward with an increasing slope, showing that population grow exponentially.

Logistic growth and carrying capacity In reality, there is simply not enough space or resources for natural populations to continue to grow

unchecked. **Limiting factors** within every ecosystem, such as the availability of food or the effects of predation and disease, prevent a population from becoming too large. These limiting factors determine an ecosystem's **carrying capacity**, or maximum population size the environment can support given all available resources.

Logistic growth describes a model for population growth that takes into account carrying capacity, and is therefore a more realistic model for population growth. According to the logistic growth model, a population first grows exponentially because there are few individuals and plentiful resources. As the population gets larger and approaches the environment's carrying capacity, resources become more scarce and the growth rate slows. This leads to the logistic growth model's characteristic S-shaped curve:



A line graph titled Logistic Growth showing population size over time. The population grows exponentially until it nears the carrying capacity, which is shown by a separate horizontal line. As the population nears carrying capacity, population growth slows significantly.

The logistic growth model reflects the natural tension between reproduction, which increases a population's size, and resource availability, which limits a population's size. The result of this tension is the maintenance of a sustainable population size within an ecosystem, once that population has reached carrying capacity.

What else should I know about population growth and carrying capacity?

- **Real population growth often deviates from the ideal logistic model.** The ideal logistic growth curve shows population size leveling off as a flat line just below carrying capacity. However, a real population's size typically oscillates around its carrying capacity. This means it's common even for a stable population to briefly exceed or dip below its carrying capacity, even though the average growth rate of the population is zero.
- **Carrying capacities can change.** An ecosystem's carrying capacity may fluctuate based on seasonal changes, or it may change as a result of human activity or a natural disaster. For example, if a fire destroys many trees in a forest ecosystem, the forest's carrying capacity for tree-nesting birds will decrease.

3) The ability to identify key factors influencing population growth and demographics and changes:

In the previous article titled 'Changing Population trends in the world', we discussed various trends in population growth. We will now discuss parameters that bring about a change in these population change patterns. A variety of factors influence population growth. They can be primarily divided into the following:

1. Education
2. Fertility Rates
3. Health Care facilities
4. Infant Mortality Rates
5. Life expectancy
6. Financial status

Amongst these**, the fertility rate is by far the most important parameter that affects population growth.** In other words, the more the number of children a family has, the more the population will increase (albeit under certain conditions). Hence, we will attempt to establish a relationship between fertility rate and the aforementioned parameters in order to gauge the lifecycle of population growth.

There exists a strong relationship between education and fertility rates. **It is widely observed that regions with more female literacy tend to have lower fertility rates as educated women tend to have fewer children.** The following graph (Figure 1) validates this relationship. (European Environment Agency, 2010)

Countries with low female literacy like Afghanistan, Niger, and Senegal have higher fertility rates. It can also be inferred from the graph that fertility rates in the developed nations are far lower than the fertility rates in poor, languishing countries. **Fertility rates in Japan, France, UK and USA offer a good contrast to the Sub Saharan nations. This implies that countries at the higher spectrum of economic growth have low population growth rates relative to their counterparts.**

4) The ability to percent the data and analysis in a clear and visually appealing format, such as chart and graph:

Make sure your data can be seen

This may sound obvious but sometimes you're too close to your presentation — literally. What is readable on your laptop may be far less so when projected on a screen. Your audience won't learn what it can't see. To avoid the debacle of sheepishly translating hard-to-see numbers and labels, rehearse your presentation with colleagues sitting as far away as the actual audience would. Ask them, "Can you see this chart clearly?" If the answer is anything but a firm "yes," redesign it to be easier on the eyes.

Focus most on the points your data illustrates

In comic book terms, you are Wonder Woman, and data is your magic lasso — a tool that strengthens your impact but has no value until you apply it purposefully. Don't leave the burden of decoding your data to your audience. It's *your* job to explain how the data supports your major points.

"Data slides aren't really about the data. They're about the meaning of the data," explains presentation design expert Nancy Duarte. "It's up to you to make that meaning clear before you click away. Otherwise, the audience won't process — let alone buy — your argument."

When you connect data to the essential points it supports, the transition should be explicit and sound like this:

"This data shows…"

"This chart illustrates…"

"These numbers prove…"

These transitions can be as important as the conclusions themselves, because you're drawing the audience's attention to those conclusions.

Share one — and only one — major point from each chart

The quickest way to confuse your audience is by sharing too many details at once. The only data points you should share are those that significantly support your point — and ideally, one point per chart. To keep your charts in check, ask yourself, "What's the single most important learning I want my audience to extract from this data?" That's the one learning you should convey. If you have several significant points to make, consider demonstrating each with a new visualization.

The mistake many presenters make is thinking they're constitutionally required to share every bullet, idea, and data point on a slide. But if

you're sharing a pivotal trend that grew dramatically between 2014 and 2017, what happened in 2013 may be pointless. If 77% of respondents prefer one product and 21% prefer another, what the remaining 2% prefer may also be too insignificant to justify mentioning.

Data-presentation guru Scot says, "The impulse is to include everything you know, [but] busy charts communicate the idea that you've been just that — busy, as in: 'Look at all the data I have and the work I've done.'"

5) The ability to integrate the data and analysis with other relevant business information:

   Data integration enables you to easily access all of the data you need to make informed business decisions and allows you to transform and combine data sources for accurate analysis. The insights that result from having your data contextualized are invaluable because they allow business users to quickly determine what actions should be taken.

6) **The ability to use the data and analysis to the inform strategic decision-making for the company or organizatio**n **Strategic: analysis** (sometimes referred to as a strategic market analysis) is the process of gathering data that helps a company's leaders decide on priorities and goals, shaping (or shifting) a long-term strategy for the business. It gives a company the ability to understand its environment and formulate a strategic plan accordingly.

ACTIVITY 3: Literature survey

The purpose of this study is to analyze the impact of population growth on sustainable development. The population growth rate has a negative effect on sustainable development according to the estimates (Generalized Least Squares and instrumental variable) obtained with data

from 146 countries covering 1990-2012 period. Accordingly, the increase in the population growth rate reduces the level of sustainable development. The population growth rate of 0-14 years has a negative effect on sustainable development, while the 15-64 years population growth rate and the population growth rate above 65 years have no significant effect on sustainable development. On the other hand, the impact of population growth on sustainable development varies according to the level of development of the countries. Population growth rate in developing countries affects sustainable development negatively; population growth rate in developed countries affects sustainable development positively.

RELATED LITERATURE: POPULATION GROWTH DEBATE

It is clear from the studies in the literature that the impact of population growth on variables such as economic growth, development and SD is controversial10. Some economists argue that population growth will have a positive impact on natural resources and therefore SD, but as Gupta et al. (2011) pointed out, the scientific evidence available does not fully support this idea. Referring to the positive effect of population growth on resources through technological innovation, Kuznets (1960) suggests that increasing population will increase the likelihood of inclusion in the world. These inclusions will help to increase and accelerate technological innovation, and thanks to these innovations, resources will be supported more effectively using SD. On the other hand, the great majority of the world's daily population of the past belongs to developing countries. In the developing countries, if the Kuznets has come to their minds, the likelihood of geniuses coming to the world is much higher than in developed countries. However, these countries are still far behind many developed countries and still lack the technological innovations that will save them from this backwardness. Simon (1981, 1996), supporting Kuznets' (1960) thought, stated that innovation has increased with population growth and that the standard of living has increased continuously since history. According to Potter and Christy (1962) and Barnett and Morse (1963), population growth is accompanied by an increase in industrial product and innovations that will 10 Hummel et al. (2013) and Gupta et al. (2011) are very useful for the

literature on the relationship between population and sustainable development. Hummel et al. (2013) examined the relationship between population and sustainable development by choosing interdisciplinary approaches. Gupta et al. (2011) examined studies that take into account population growth and sustainable development as well as poverty. Reduce the price of products produced with scarce resources. Similarly, Booze-up (1965) suggested that population growth would stimulate agricultural innovation, leading to increased productivity. In addition to these studies, Ehrlich (1968) and Meadows et al. (1972) noted that technological innovations and population growth could reduce the pressure on resources. According to the World Bank (2010) and The Royal Society (2012), population growth11 is accompanied by an increase in food demand, and therefore both productivity and environmental protection regulations must be equalized in the studies analyzing the population increase by the data of variables such as environment, population and poverty. The low population growth by employment leads to an increase in the real wealth per capita. Disrupt (2010), which also benefits from the study of Arrow et al. (2004), showed that per capita welfare is diminishing in spite of increasing GDP, per capita income and Human Development Index (HDI), when population growth and SD are taken together. Similar to Arrow et al. (2004) and Disrupt (2010), Hamilton and Atkinson (2006) compared the population growth rate with the total welfare change rate. According to the study, the per capita income was moderate while the calculated total welfare rate was below the population growth rate. The fact that the total welfare ratio is continuously below the population growth rate proves that this trend is unsustainable. For sustainability, it depends on countries rising saving rates to very high levels. On the other hand, when the SD is measured by Adjusted Net Saving, the effect of the population on SD is not clear. For example, Guiney (2015a) found that there is a positive but meaningless relationship between 11 In addition to population growth, national and population growth and SD in developing countries, negative and significant in developed countries, and developed countries in the study of relationship between governance and SD. In the study Car bonnier et al. (2011) analyzed dependence on natural resources and the impact of governance on SD, there is a negative relationship between SD and population growth, and a positive

but meaningless relationship with population density and rural population ratio. According to Aid (2009), which examines the relationship between institutional quality and SD, there is a negative relationship between population growth and SD between 1970 and 2000, but this relationship is not significant. Reducing the population growth rate contributes to SD by lowering carbon emissions. Dyson (2005) predicted that the reduction in fertility rates and the decrease in the flux of resources could reduce the pressure on carbon emissions by 2050 by 40 percent. O'Neill et al. (2010) found that the carbon emission rate decreased significantly in the case of population growth. South (2015) emphasized that there is a negative relationship between population growth and environmental sustainability. Population growth by employment alone has a positive and significant impact on environmental sustainability only in OECD member countries. Hardin (1968), Fear side (1986), Meadows et al. (1972), Ehrlich and Holden (1971) emphasize that population growth is the only cause of environmental pollution and malnutrition, with an ecologist12 approach based on the world's transport capacity and economic growth. Ehrlich and Holden (1971) have been a pioneering work in this regard, demonstrating the impact of population (P), consumption (A) and technology (T) on the environment (I) with the I-PAT13 model14. According to Ehrlich and Holden (1971) and Keya (1990), economic development is the fundamental variable of technological development and population growth, energy consumption and carbon emissions. 4. DATA AND METHOD In this study, the following model is estimated using the unbalanced panel data method: Saving it= αi+γt+β1Populationit+ β2 Gdpgrowthit+β3Corruptionit+ β4Consumptionit+β5Opennessit, (1) in equation (1), i is the number of units, t is the time interval, and ε is the error value. Saving represents to adjusted net saving, Population represents to population growth rate, growth represents to GDP growth rate, Corruption represents to corruption level, Consumption represents to consumption expenditure and Openness (trade openness) represents to ratio of imports and exports to GDP. As an SD variable in other words "genuine investment" is used. It is frequently used and calculated by economists as the SD indicator (Aids, 2010). Saving manufacturing industry, human, social and natural capital variables are calculated with their current prices. Saving, defined and calculated by WB,

is calculated by subtracting the reduction in rent (R) and carbon dioxide emissions (CD) from the net capital used after the consumption of natural capital15 (E), after the expenditures of the national net savings (Gs-Dap) as seen in equation (2).The national net saving is obtained by

ACTIVITY 4: Social or business impact

The report reviews the connections between population growth and key aspects of social and economic development, including **poverty, hunger and malnutrition, health, education, gender equality, economic growth and decent work**. It also explores the contribution of global population increase to environmental degradation, including climate change.

United Nations Department of Economic and Social Affairs:

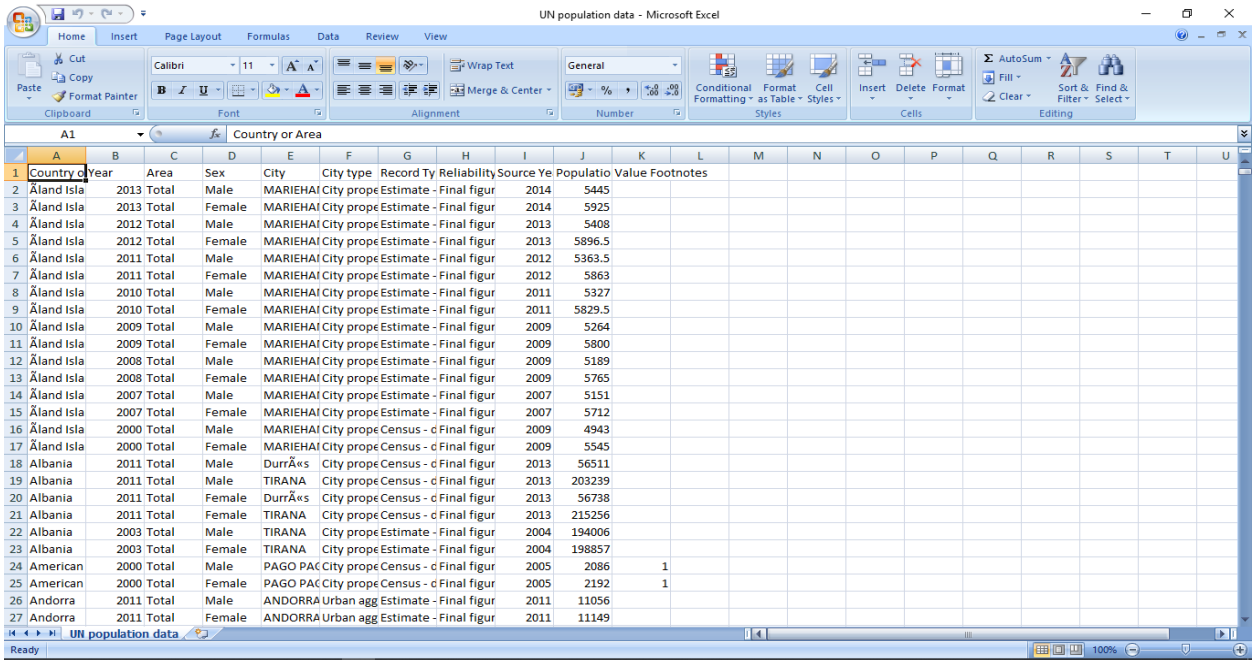
Population Division the Department of Economic and Social Affairs of the United Nations Secretariat is a vital interface between global policies in the economic, social and environmental spheres and national action. The Department works in three main interlinked areas: (i) it compiles, generates and analyses a wide range of economic, social and environmental data and information on which States Members of the United Nations draw to review common problems and take stock of policy options; (ii) it facilitates the negotiations of Member States in many intergovernmental bodies on joint courses of action to address ongoing or emerging global challenges; and (iii) it advises interested Governments on the ways and means of translating policy frameworks developed in United Nations conferences and summits into programmers at the country level and, through technical assistance, helps build national capacities. The Population Division of the Department of Economic and Social Affairs provides the international community with timely and accessible population data and analysis of population trends and development outcomes for all countries and areas of the world. To this end, the Division undertakes regular studies of population size and characteristics and of all three components of population change (fertility, mortality and migration). Founded in 1946, the Population Division provides substantive support on

population and development issues to the United Nations General Assembly, the Economic and Social Council and the Commission on Population and Development. The Population Division also leads or participates in various interagency coordination mechanisms of the United Nations system. It also contributes to strengthening the capacity of Member States to monitor population trends and to address current and emerging population.

MILESTON 2: Data collection & extraction from database

Activity 1: Collect the dataset

To download the given dataset by using the link



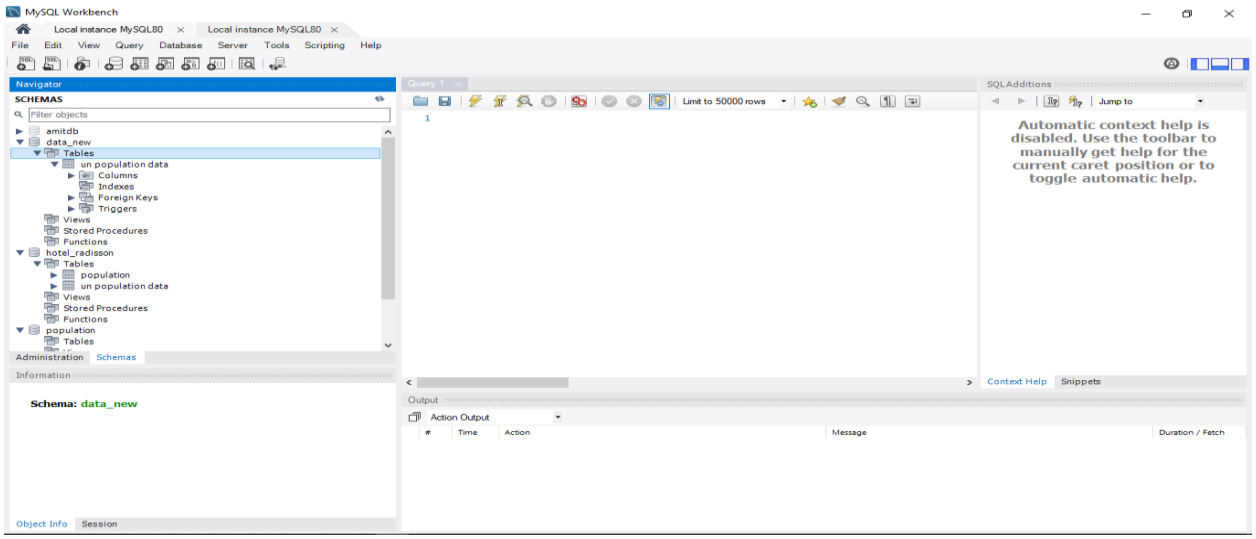
Country or	Year	Area	Sex	City	City type	Record Ty	Reliability	Source Ye	Populatio	Value Footnotes
Ã¥land Isla	2013	Total	Male	MARIEHAI	City prope	Estimate -	Final figur	2014	5445	
Ã¥land Isla	2013	Total	Female	MARIEHAI	City prope	Estimate -	Final figur	2014	5925	
Ã¥land Isla	2012	Total	Male	MARIEHAI	City prope	Estimate -	Final figur	2013	5408	
Ã¥land Isla	2012	Total	Female	MARIEHAI	City prope	Estimate -	Final figur	2013	5896.5	
Ã¥land Isla	2011	Total	Male	MARIEHAI	City prope	Estimate -	Final figur	2012	5363.5	
Ã¥land Isla	2011	Total	Female	MARIEHAI	City prope	Estimate -	Final figur	2012	5863	
Ã¥land Isla	2010	Total	Male	MARIEHAI	City prope	Estimate -	Final figur	2011	5327	
Ã¥land Isla	2010	Total	Female	MARIEHAI	City prope	Estimate -	Final figur	2011	5829.5	
Ã¥land Isla	2009	Total	Male	MARIEHAI	City prope	Estimate -	Final figur	2009	5264	
Ã¥land Isla	2009	Total	Female	MARIEHAI	City prope	Estimate -	Final figur	2009	5800	
Ã¥land Isla	2008	Total	Male	MARIEHAI	City prope	Estimate -	Final figur	2009	5189	
Ã¥land Isla	2008	Total	Female	MARIEHAI	City prope	Estimate -	Final figur	2009	5765	
Ã¥land Isla	2007	Total	Male	MARIEHAI	City prope	Estimate -	Final figur	2007	5151	
Ã¥land Isla	2007	Total	Female	MARIEHAI	City prope	Estimate -	Final figur	2007	5712	
Ã¥land Isla	2000	Total	Male	MARIEHAI	City prope	Census - d	Final figur	2009	4943	
Ã¥land Isla	2000	Total	Female	MARIEHAI	City prope	Census - d	Final figur	2009	5545	
Albania	2011	Total	Male	DurrÃ«s	City prope	Census - d	Final figur	2013	56511	
Albania	2011	Total	Male	TIRANA	City prope	Census - d	Final figur	2013	203239	
Albania	2011	Total	Female	DurrÃ«s	City prope	Census - d	Final figur	2013	56738	
Albania	2011	Total	Female	TIRANA	City prope	Census - d	Final figur	2013	215256	
Albania	2003	Total	Male	TIRANA	City prope	Estimate -	Final figur	2004	194006	
Albania	2003	Total	Female	TIRANA	City prope	Estimate -	Final figur	2004	198857	
American	2000	Total	Male	PAGO PAC	City prope	Census - d	Final figur	2005	2086	1
American	2000	Total	Female	PAGO PAC	City prope	Census - d	Final figur	2005	2192	1
Andorra	2011	Total	Male	ANDORRA	Urban agg	Estimate -	Final figur	2011	11056	
Andorra	2011	Total	Female	ANDORRA	Urban agg	Estimate -	Final figur	2011	11149	

Activity 1.1: Understand the data

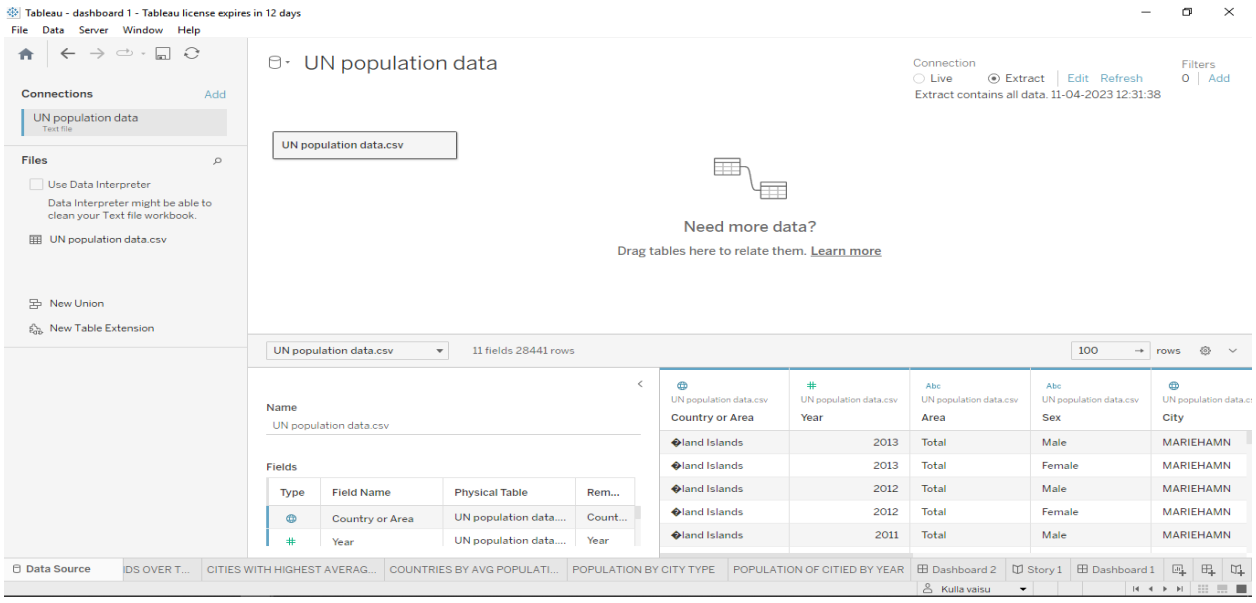
The data was compiled by UNSD

To understand more about the dataset, please go through this:
https://datahub.io/core/population-city

Activity 2: Storing Data in DB & Perform SQL operations

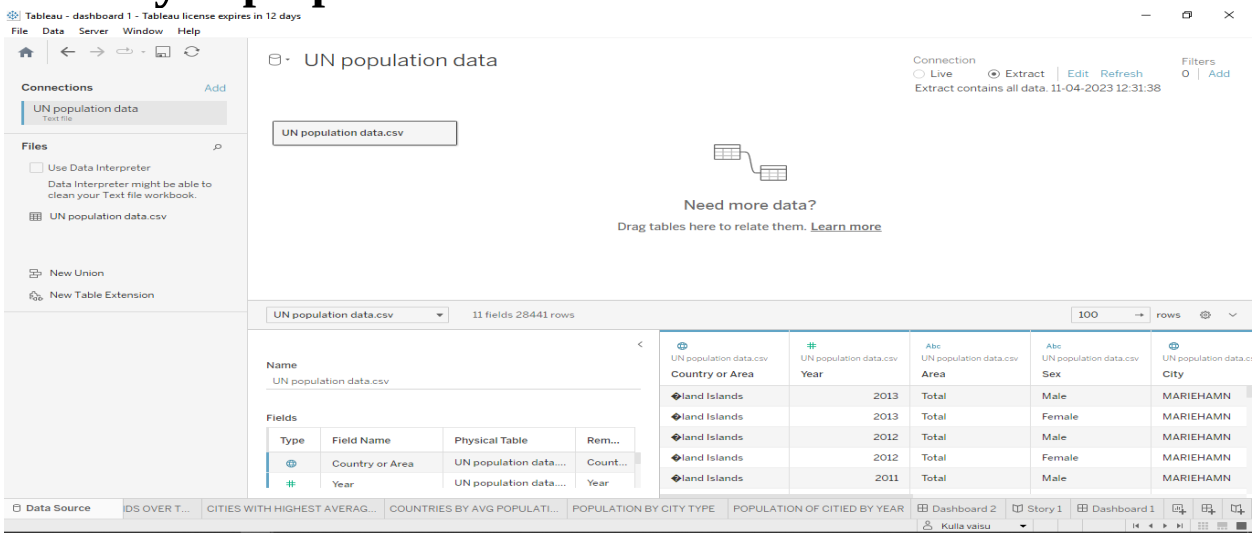


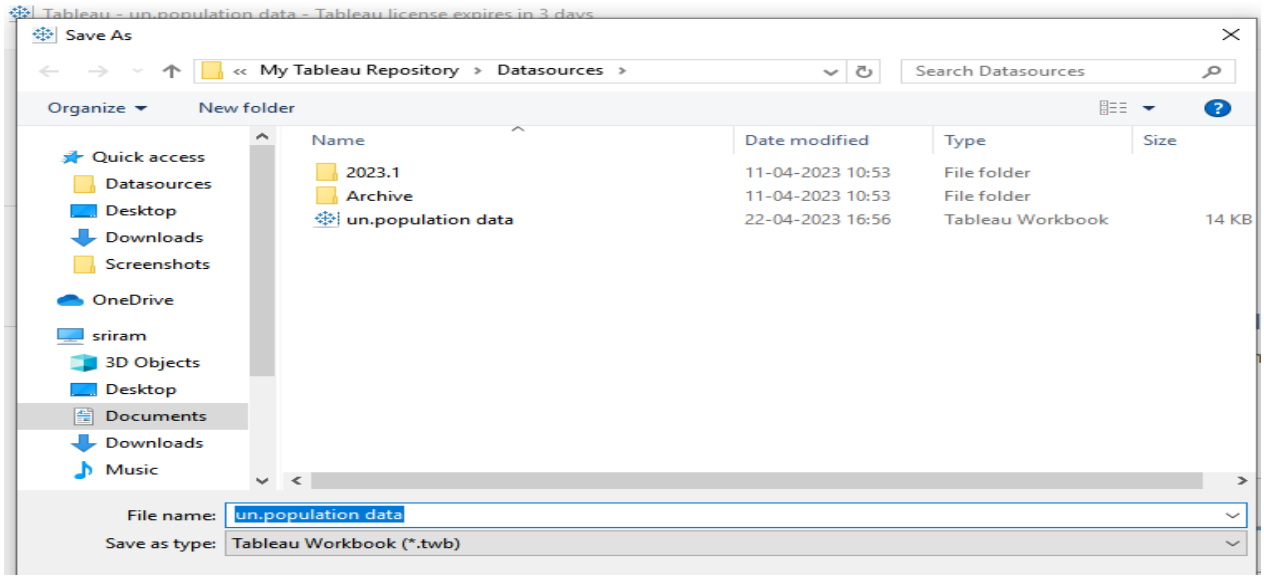
Activity 3: Connect DB with Tableau



Milestone 3: Data preparation

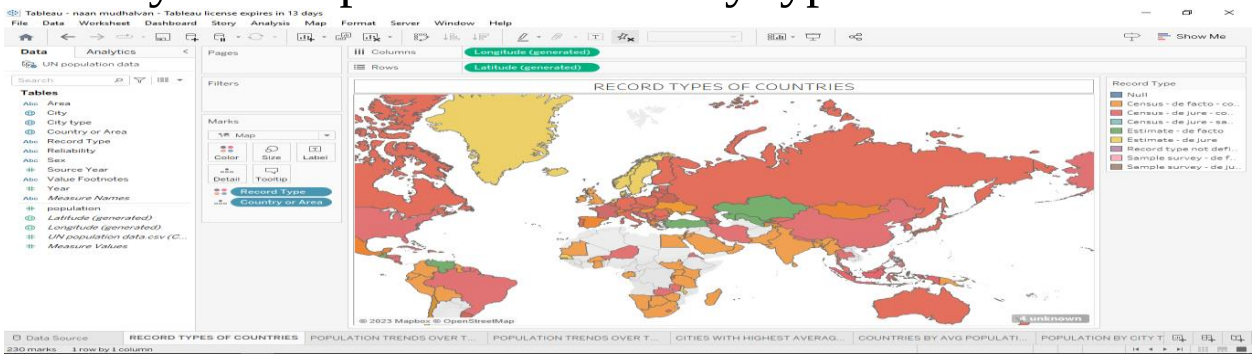
Activity 1: prepare the Data for visualization



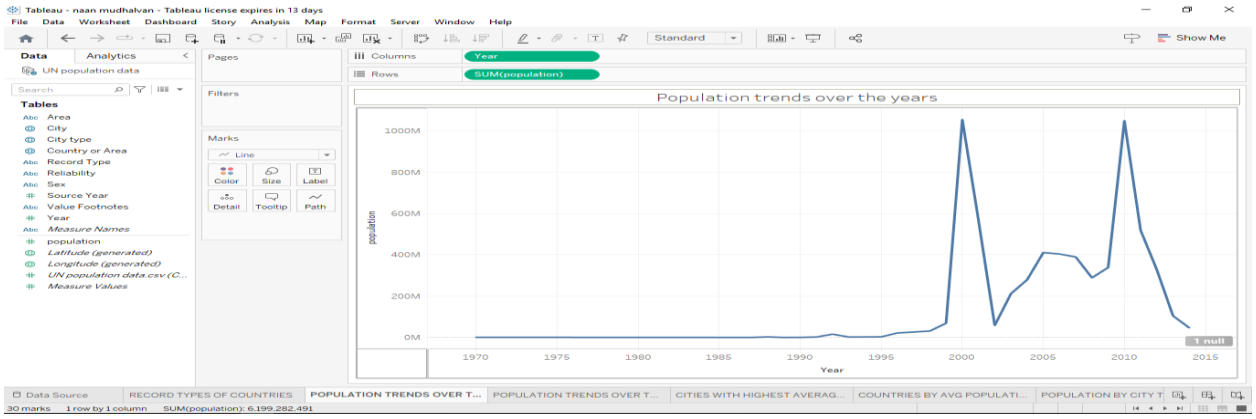


Milestones 4: Data visualization

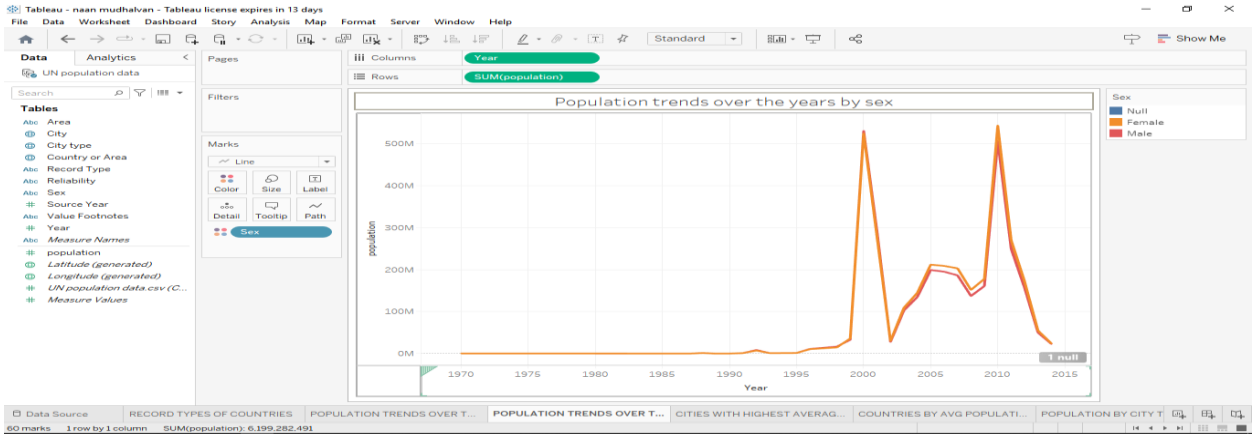
Activity 1.1: Population records by type of countries



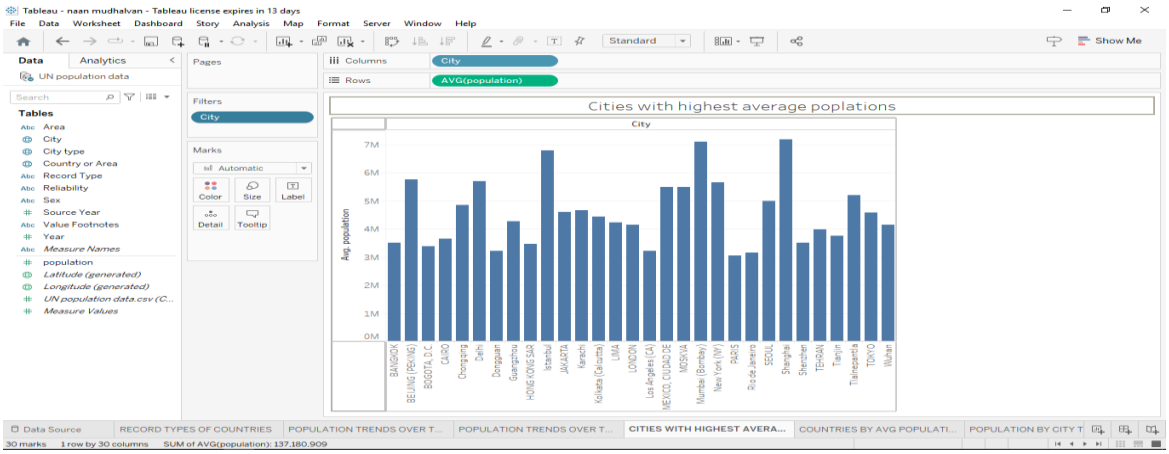
Activity 1.2: Population trends over the year



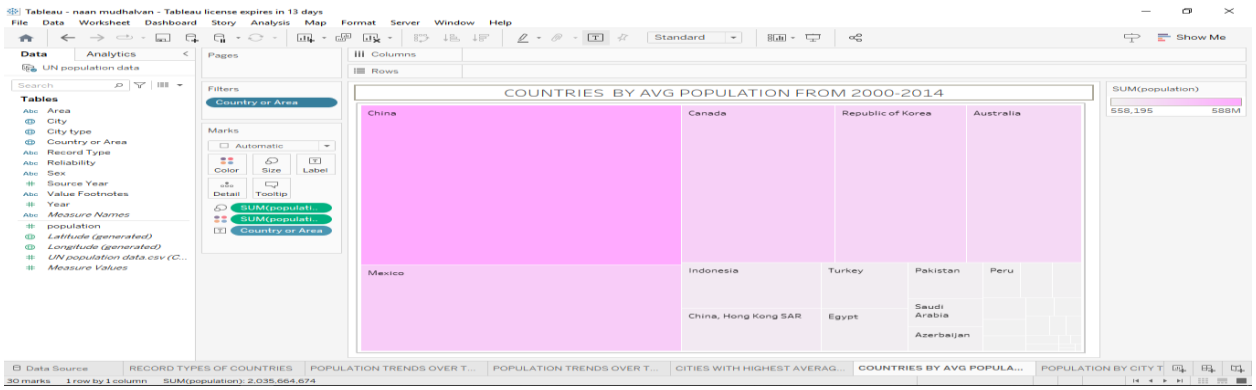
Activity 1.3: Population trends over the year by sex



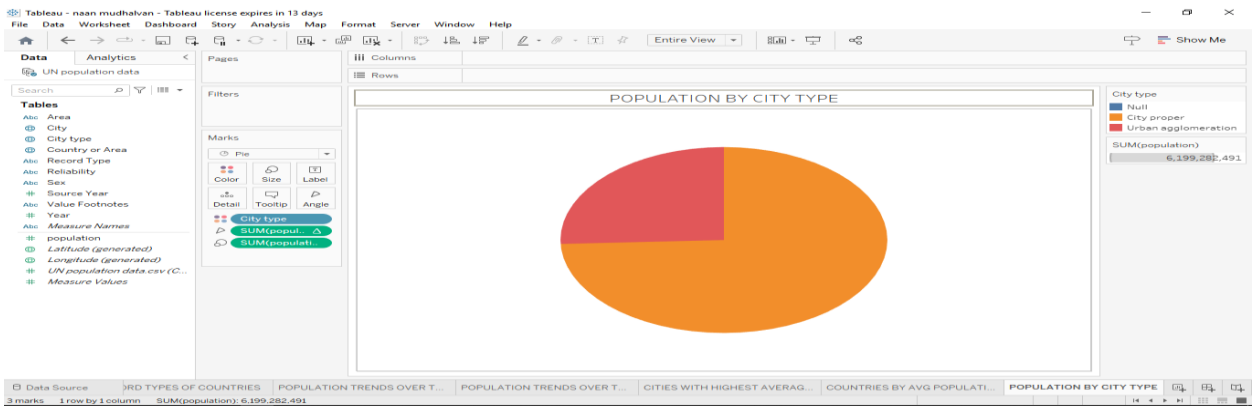
Activity 1.4: Cities with highest average populations



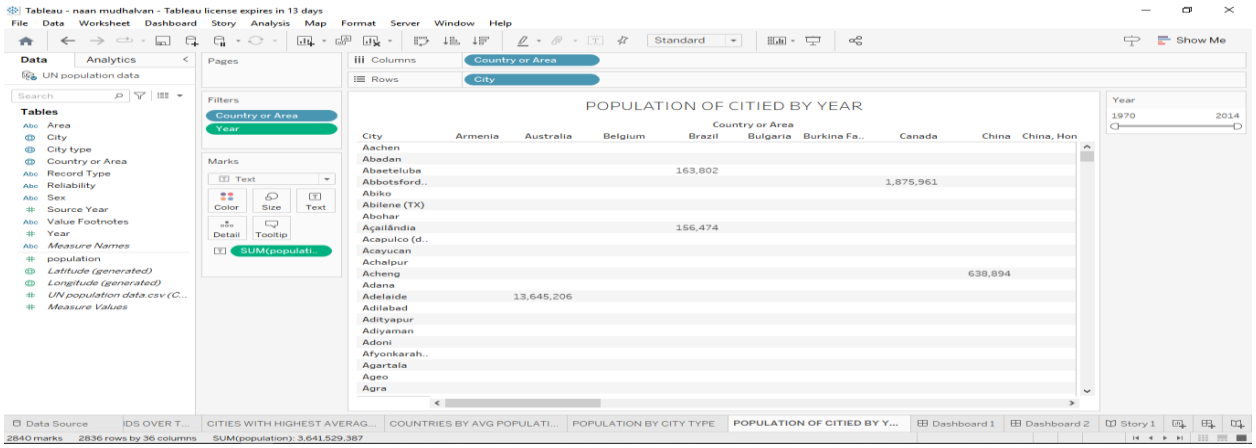
ACTIVITY 1.5: Countries with highest average population from 2000-2014



Activity 1.6: Population by city type

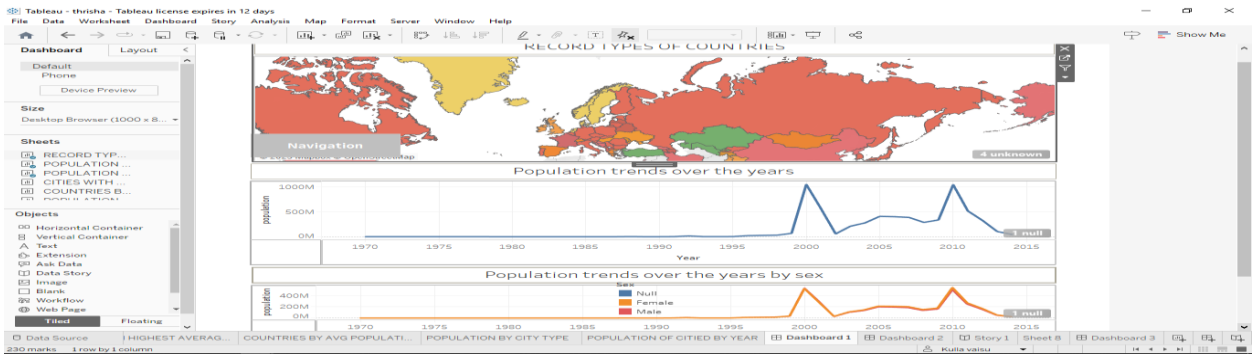


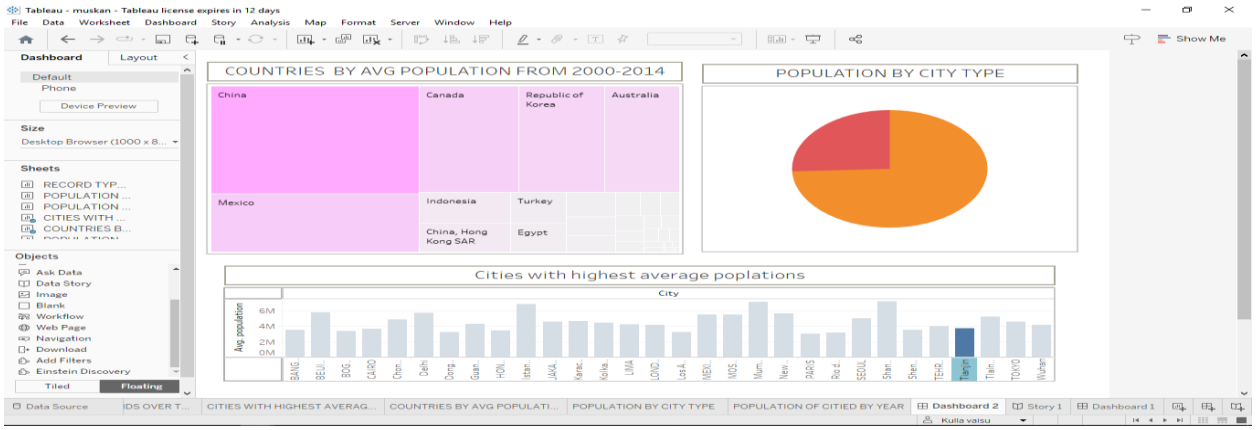
Activity 1.7: Population of citied by year



MILESTONE 5: Dashboard

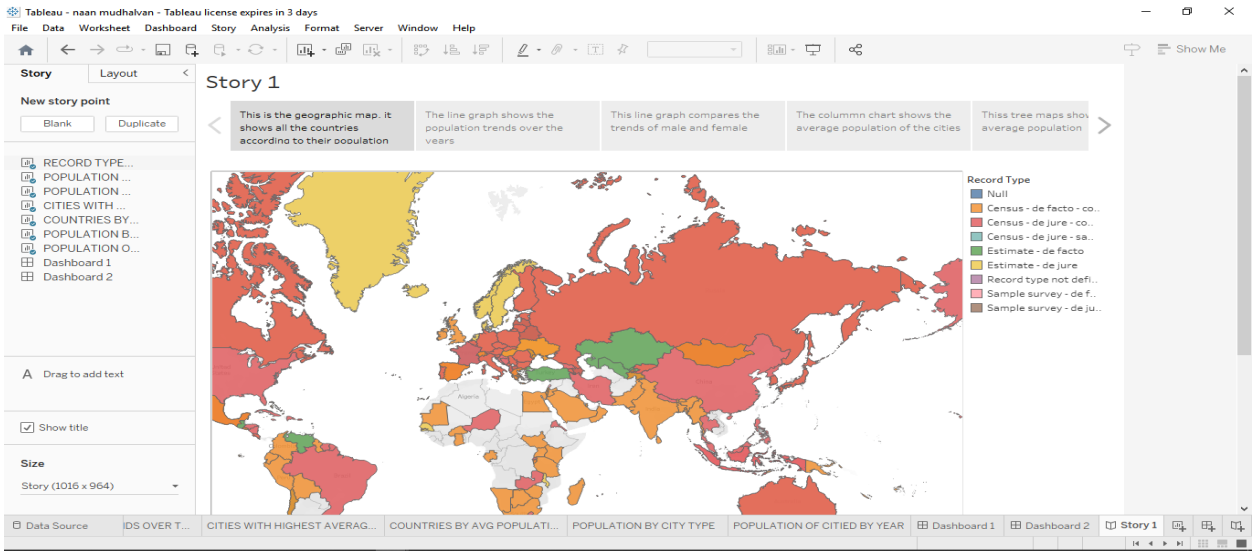
Activity 1: Responsive and design of Dashboard

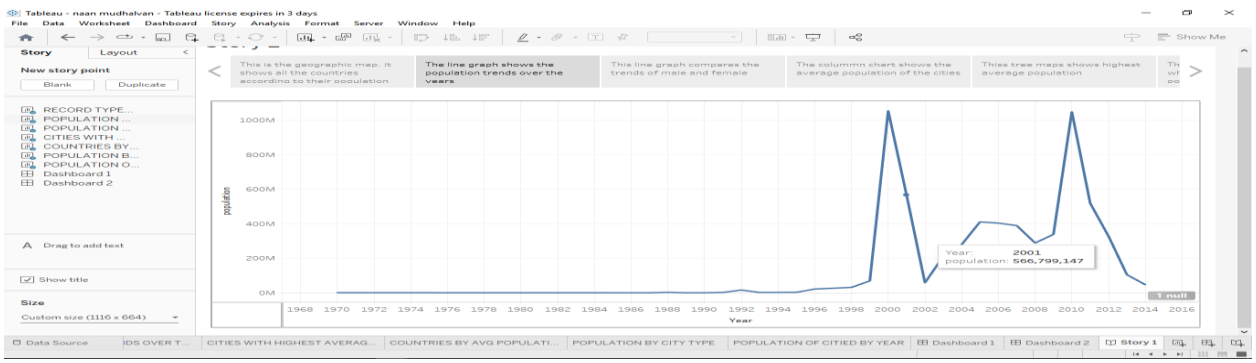


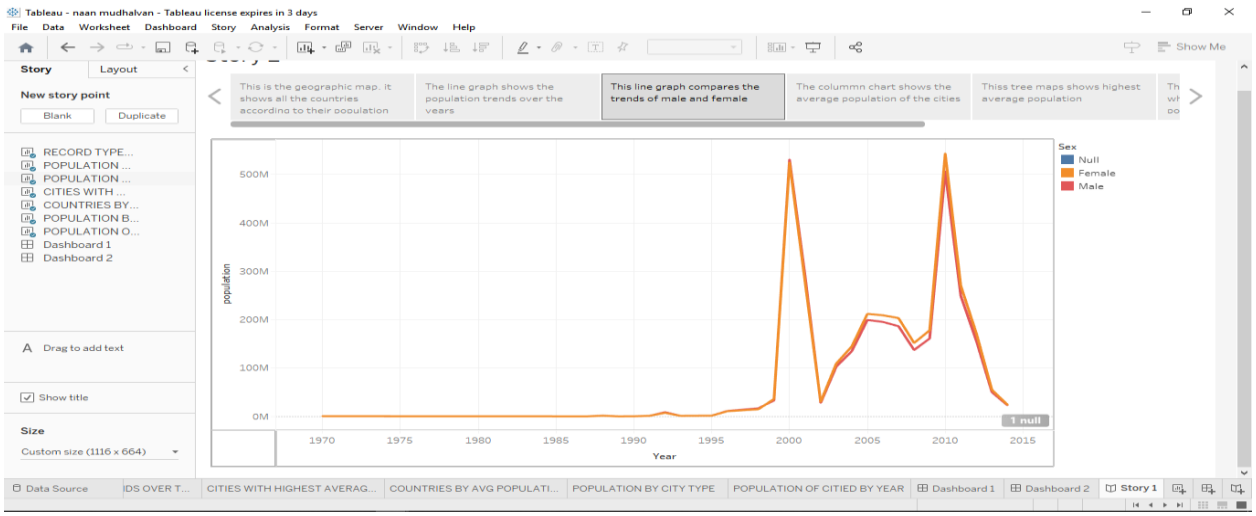


MILESTONE 6: Story

Activity 1: No of scenes story







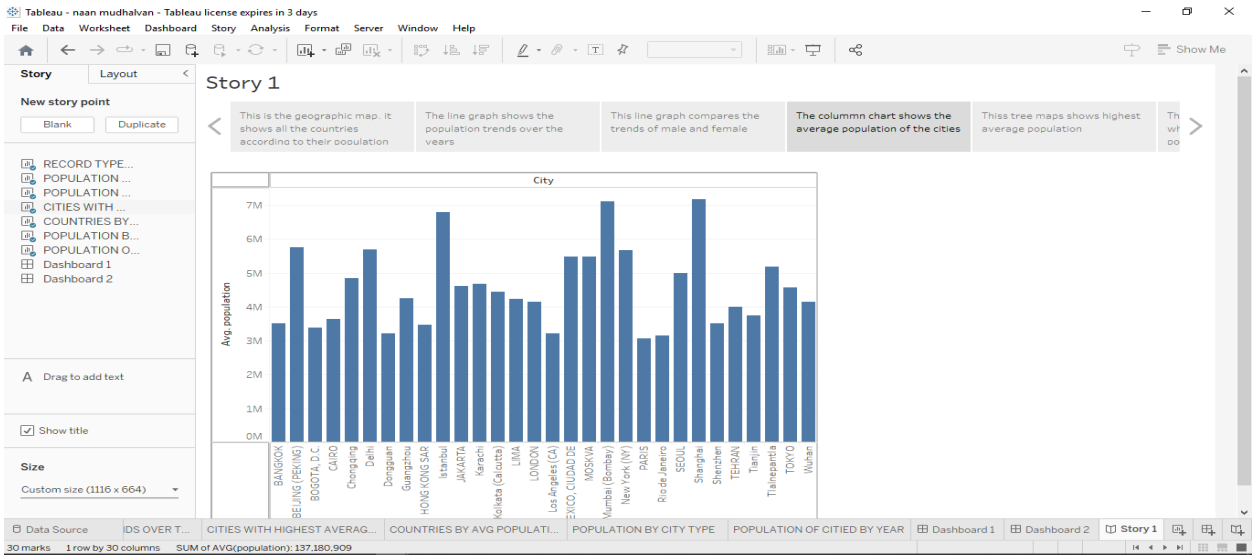


Tableau - naan mudhalvan - Tableau license expires in 3 days
Story 1
This is the geographic map. it shows all the countries according to their population
The line graph shows the population trends over the years
This line graph compares the trends of male and female
The columnn chart shows the average population of the cities
Thiss tree maps shows highest average population
City
Avg. population
7M
6M
5M
4M
3M
2M
1M
0M
BANGKOK
BEIJING (PEKING)
BOGOTA, D.C
CAIRO
Chongqing
Delhi
Dongguan
Guangzhou
HONG KONG SAR
Istanbul
JAKARTA
Karachi
Kolkata (Calcutta)
LIMA
LONDON
Los Angeles (CA)
MEXICO, CIUDAD DE
MOSKVA
Mumbai (Bombay)
New York (NY)
PARIS
Rio de Janeiro
SEOUL
Shanghai
Shenzhen
TEHRAN
Tianjin
Thalnepantla
TOKYO
Wuhan
30 marks
1 row by 30 columns
SUM of AVG(population): 137,180,909

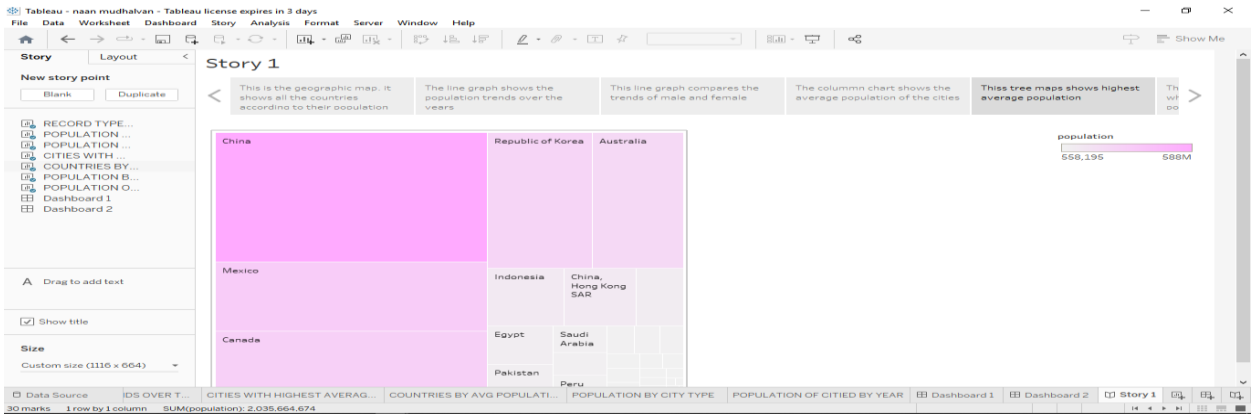


Tableau - naan mudhalvan - Tableau license expires in 3 days
Story 1
This is the geographic map. it shows all the countries according to their population
The line graph shows the population trends over the years
This line graph compares the trends of male and female
The columnn chart shows the average population of the cities
Thiss tree maps shows highest average population
China
Republic of Korea
Australia
Mexico
Indonesia
China, Hong Kong SAR
Canada
Egypt
Saudi Arabia
Pakistan
Peru
population
558,195
588M
30 marks
1 row by 1 column
SUM(population): 2,035,664,674

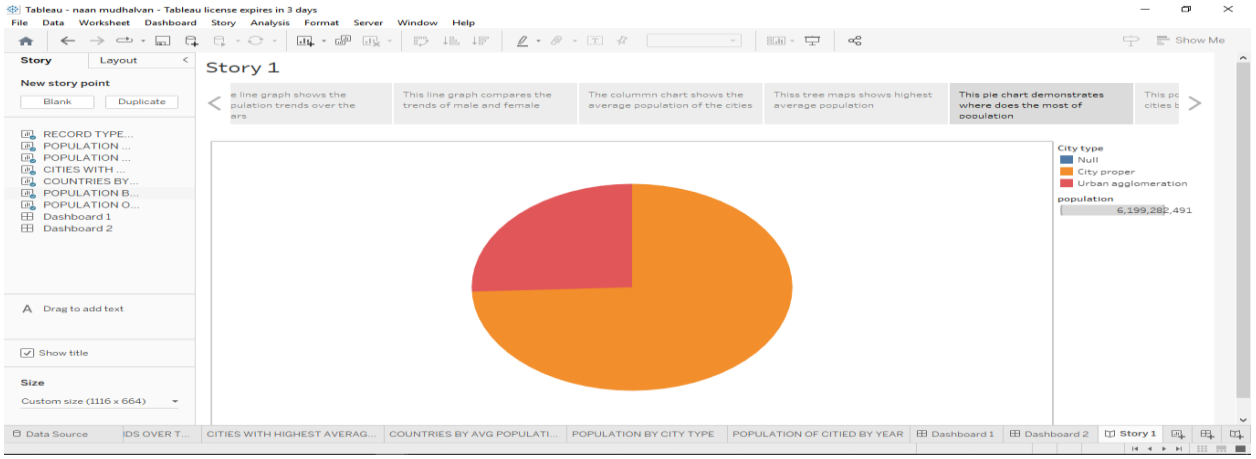
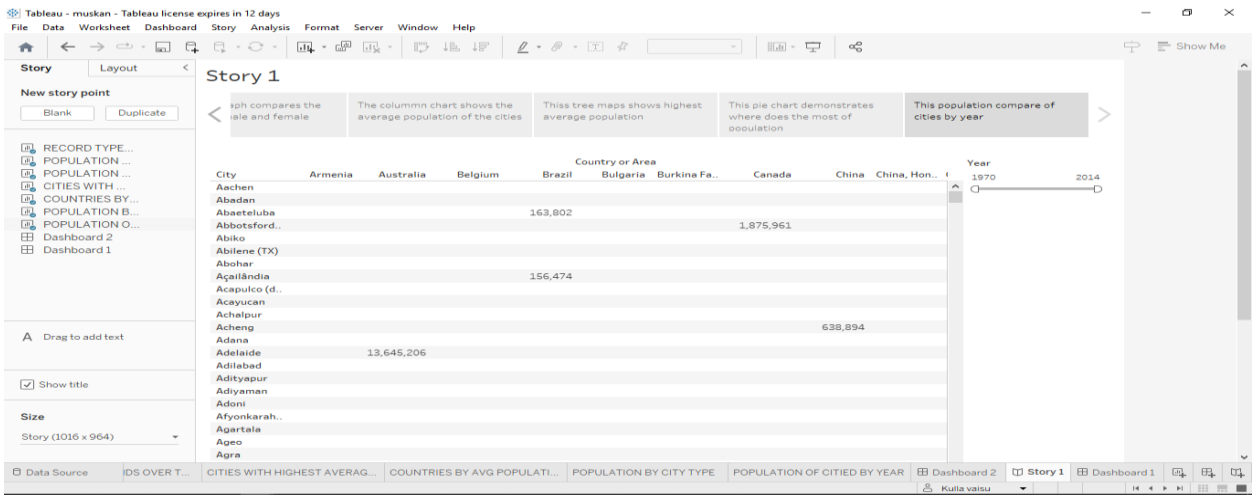
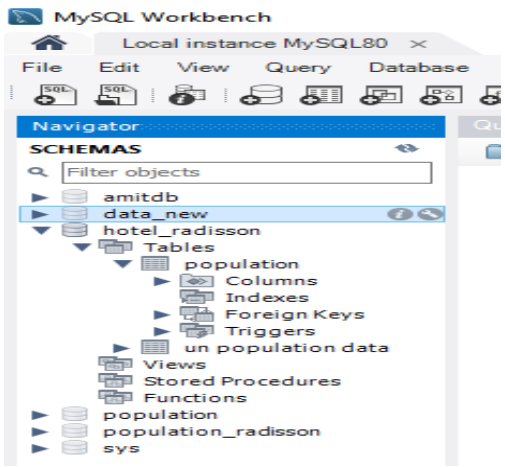


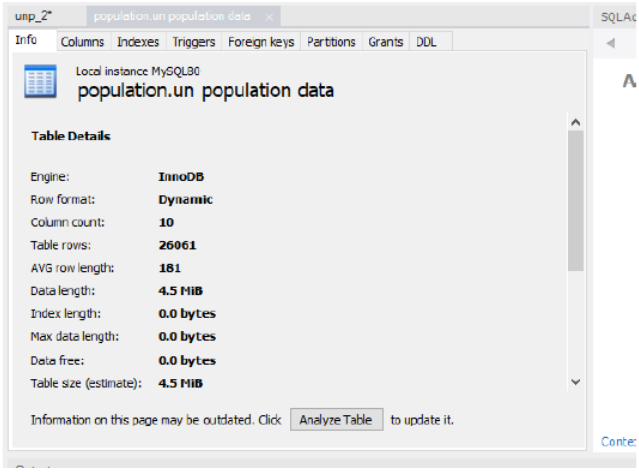
Tableau - naan mudhalvan - Tableau license expires in 3 days
Story 1
This line graph compares the trends of male and female
The columnn chart shows the average population of the cities
Thiss tree maps shows highest average population
This pie chart demonstrates where does the most of population
City type
Null
City proper
Urban agglomeration
population



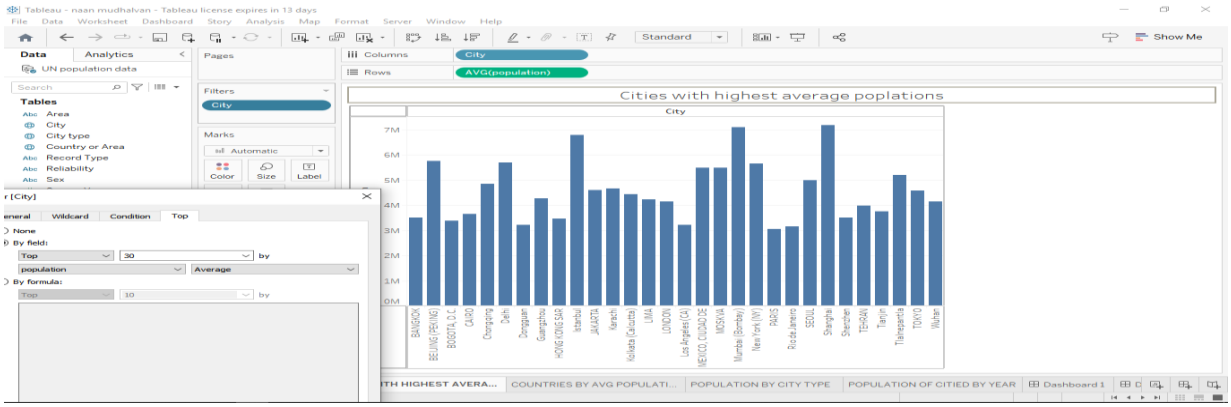
MILESTONE 7: Performance Testing

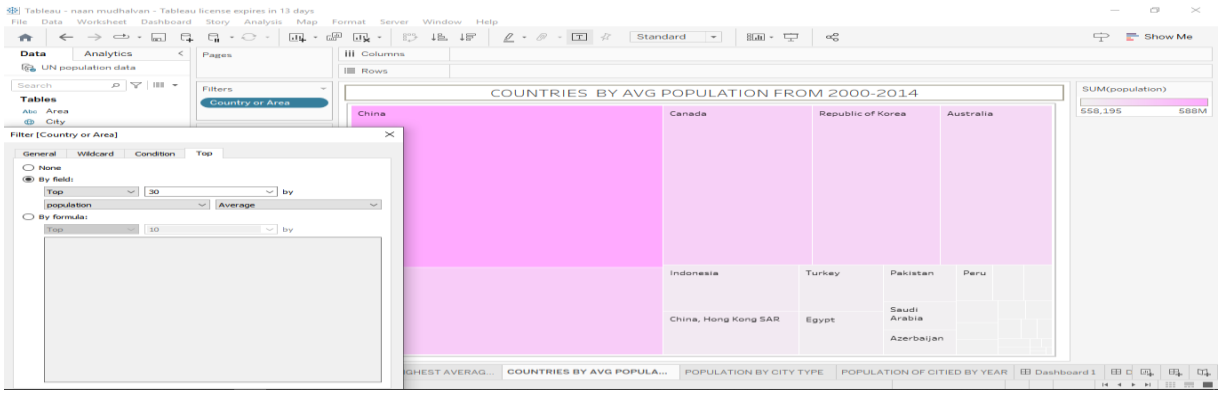
Activity 1: Amount of data rendered to DB



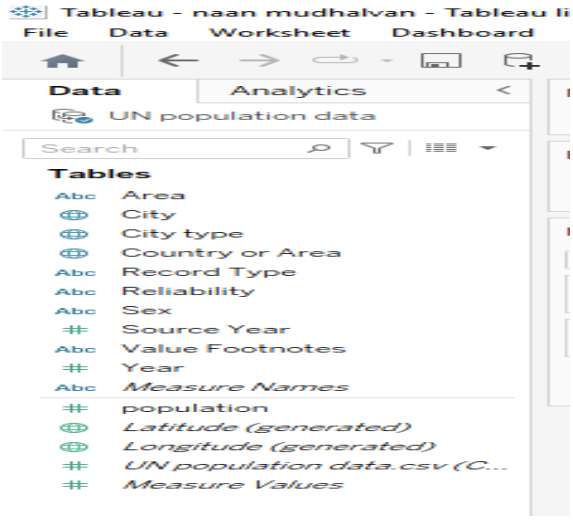


Activity 2: Utilization of data filters





Activity 3: No of calculation fields



Activity 4: No of visualizations/Graphs

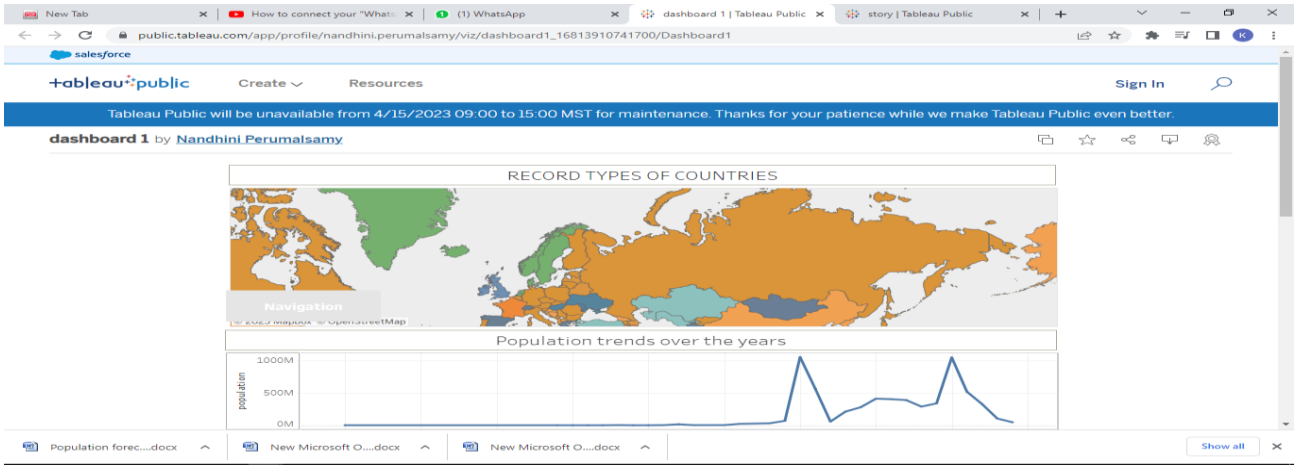
1. Population record types of countries
2. Population trends over the years
3. Population trends over the years by sex
4. Cities with highest average population
5. Countries with highest average population from 2000 - 2014
6. Population by city type
7. Population of cities by year

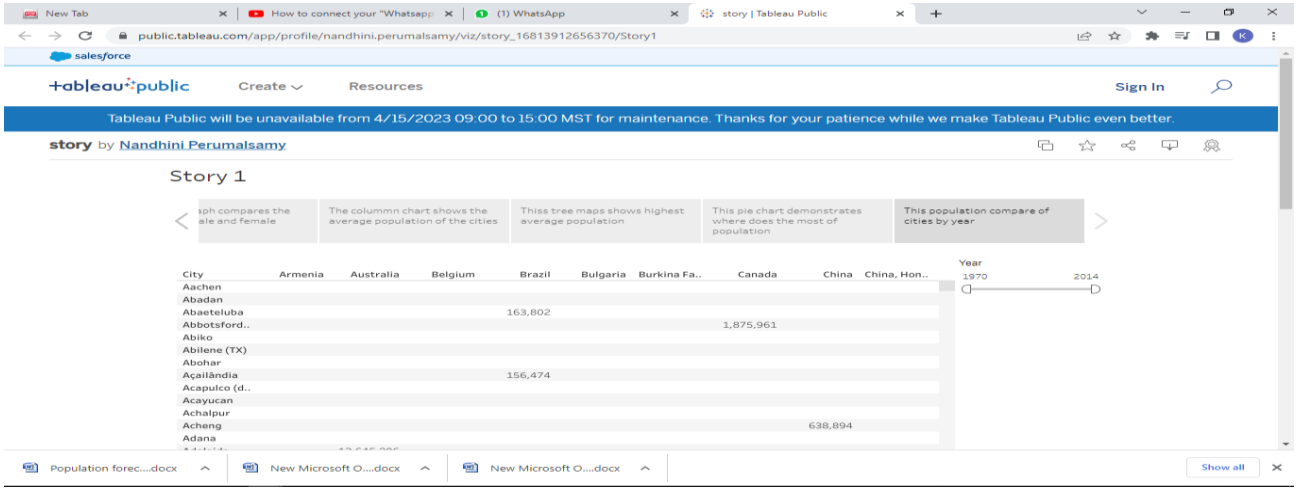
MILESTONE 8: Web integration

Step 1: Publishing dashboard and reports to tableau public

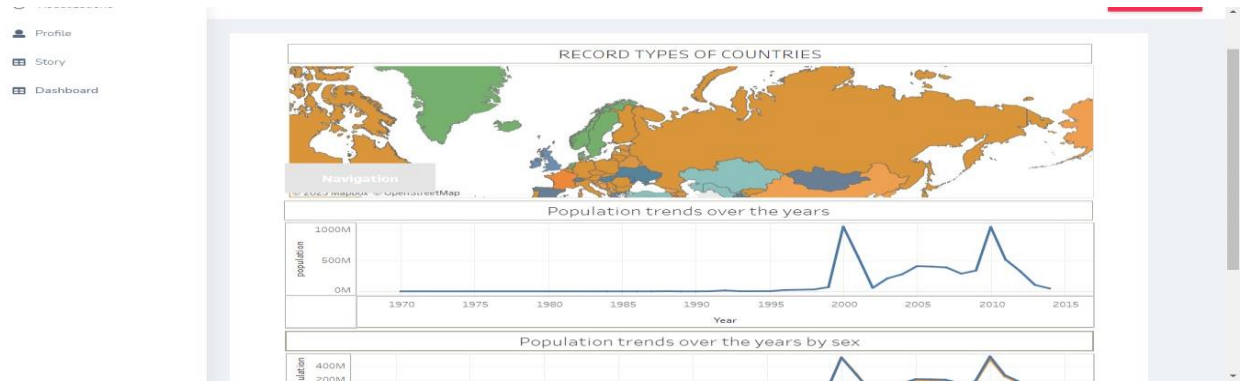
Step 2: Once you click on connect it will ask you for tableau public user name and password

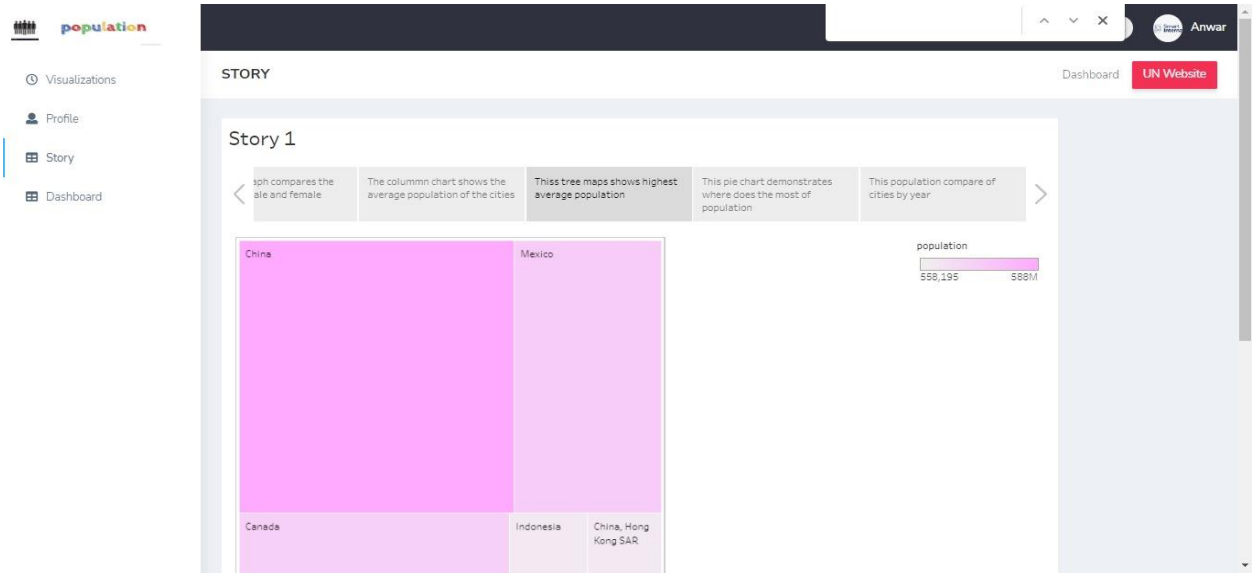
Once you login into your tableau public using the credentials, the particular visualization will be published into tableau public





Activity 1: Dashboard and story embed with UI with Flask




population
Visualizations
Profile
Story
Dashboard
STORY
Anwar
Dashboard
UN Website
Story 1
The columnn chart shows the average population of the cities
Thiss tree maps shows highest average population
This pie chart demonstrates where does the most of population
This population compare of cities by year
China
Mexico
Canada
Indonesia
China, Hong Kong SAR
population
558,195
588M