Name: Jignyu Jia
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Introduction

Globalization interconnects countries worldwide and it has flourished global economy through all kinds of aspects. Interconnectedness among countries globally also brings international migrants with each other. Therefore, I'm trying to analyze the trends of immigration by reviewing *Trends in International Migrant Stock: The 2015 Revision* revised by Department of Economic and Social Affairs from UN. In the document, I am given the information of international migrant stock, total population, international migrant stock, female migrants as a percentage of the international migrant, annual rate of change of the migrant stock, and estimated refugee stock. I'll then try to visualize the information followed Tufte's principle and analyze them in the following.

Methods

Tufte's principles of visualization:

- well-designed presentation of data of substance, statistics and design
- complex ideas communicated with clarity, precision and efficiency
- the greatest number of ideas in the shortest time with the least ink in the smallest space.

Following Tufte's principles, I try to illustrate every diagram with clear and efficient visualization methods. Matplotlib.pyplot and seaborn are the two polt libraries I'm using to generate my diagrams.

Results & Discussion

Table1: International migrant stock at mid-year by sex and by major area, region, country or area, 1990-2015

Using Tufte's principles of visualization:

well-designed presentation of data of substance, statistics and design

For table #1, I 'm trying to show the trend of immigrants by gender accord to years in the world. I drop the information of 'both sexes' and find the value of world (it is when country code is 900). According to year, I add up 'International migrant stock at mid-year' separated by gender and I use line plot to show the difference. In the lineplot, I set y = International migrant stock, x=year, and hue as gender to separate them.

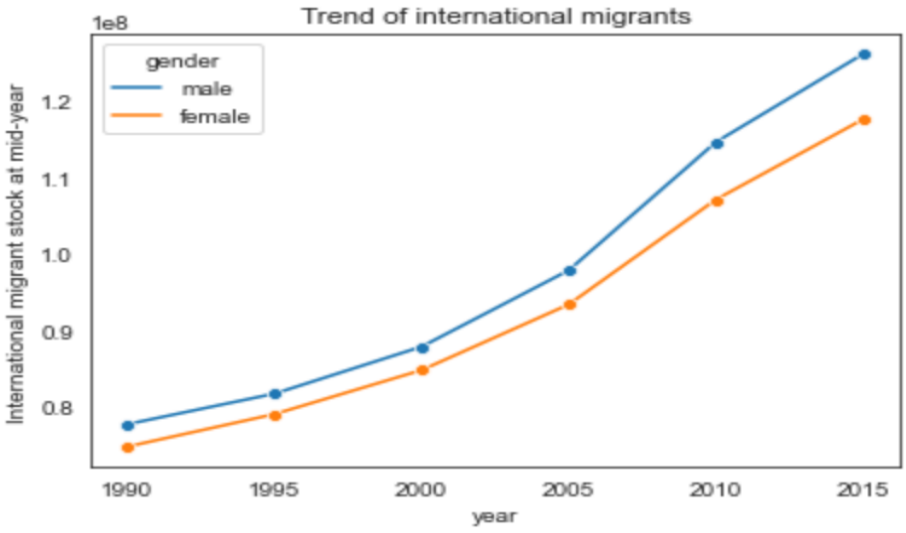

Figure 1

Generally speaking, male international migrants stock is larger than female international migrants in the world from time to time.

Table 2 - Total population at mid-year by sex and by major area, region, country or area, 1990-2015

Using Tufte's principles of visualization:

complex ideas communicated with clarity, precision and efficiency

For table #2, I'm trying to show the distribution of population from the different regions in 2015 along with the trend of each region from time to time. I use pie to illustrate the distribution and lineplot to show the trend. In order to set both diagrams to be shown together horizontally, I set lingplot in the pir diagram. For pie chart , I select values form 'both sexes' and 'year' in 2015 and I divide 'Total population at mid-year' by regions and label them by 'Major area'. For lineplot, I set y = 'Total population at mid-year' by regions, x=year, and hue as 'Major area' to separate them.

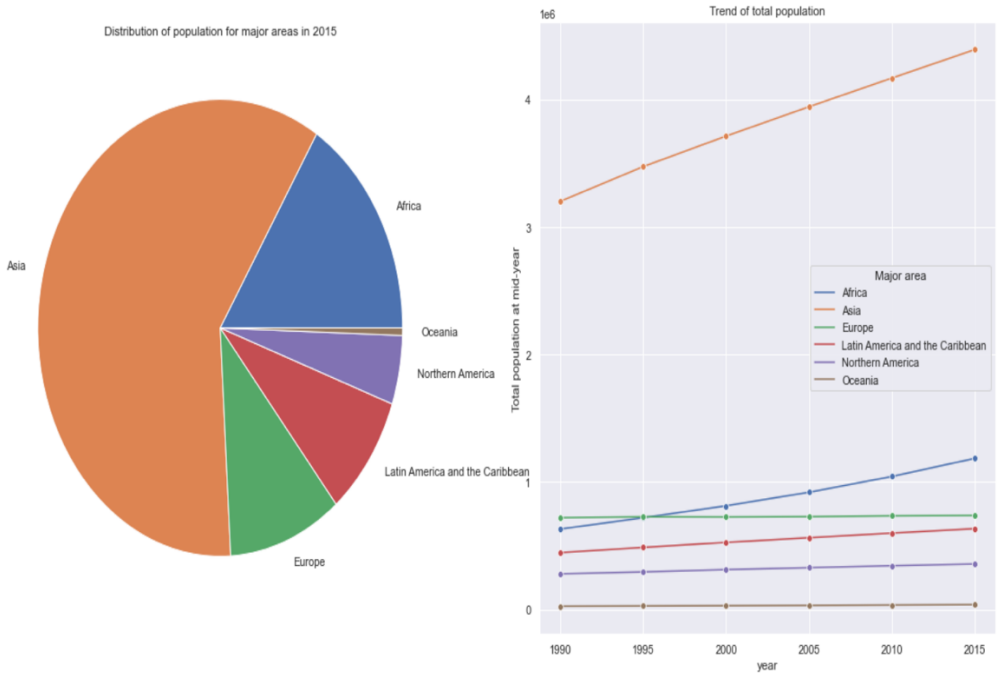

Figure 2

From figure2, we can see the Asia accounts for the largest population in 2015 and it's trend of growth is the biggest.

Table 3 - International migrant stock as a percentage of the total population by sex and by major area, region, country or area, 1990-2015

Using Tufte's principles of visualization:

well-designed presentation of data of substance, statistics and design

For table#3, I'm trying to show the distributions of migrants as a percentage of total population for different years. Since the values are about percentage, I would like to use boxplot to compare the difference between gender in a given year.

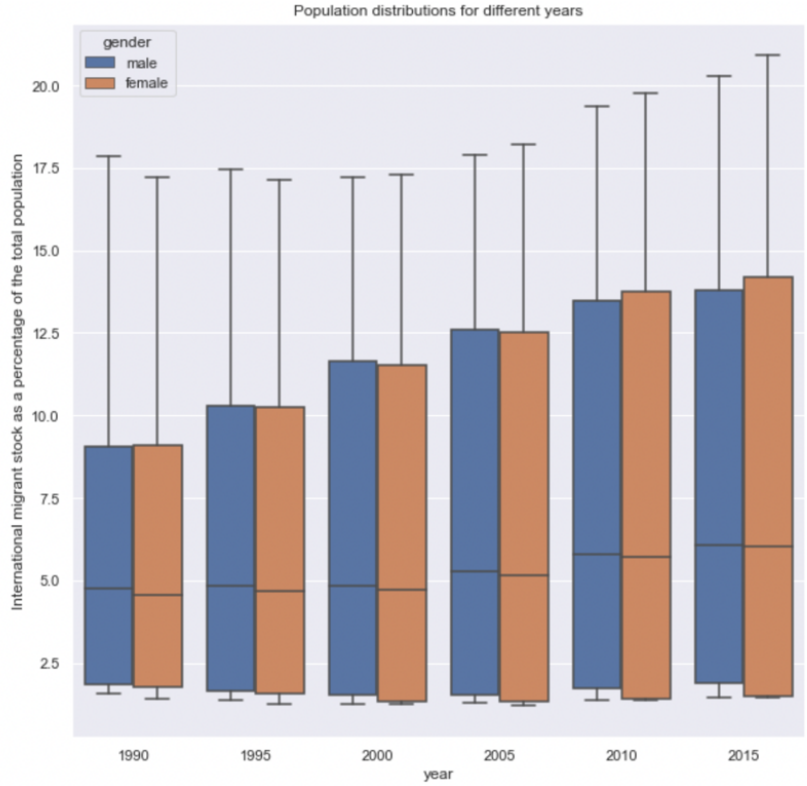

Figure 3

From figure 3, we can see there is no major difference of international migrant percentage of total population between gender in a given year.

Table 4 - Female migrants as a percentage of the international migrant stock by major area, region, country or area, 1990-2015

Using Tufte's principles of visualization:

well-designed presentation of data of substance, statistics and design

For table #4, I trying to use violinplot to represent 'Distribution of female migrants over the years'. I set x='year', y= 'Female migrants as a percentage of the international migrant stock' and title as 'Distribution of female migrants over the years'.

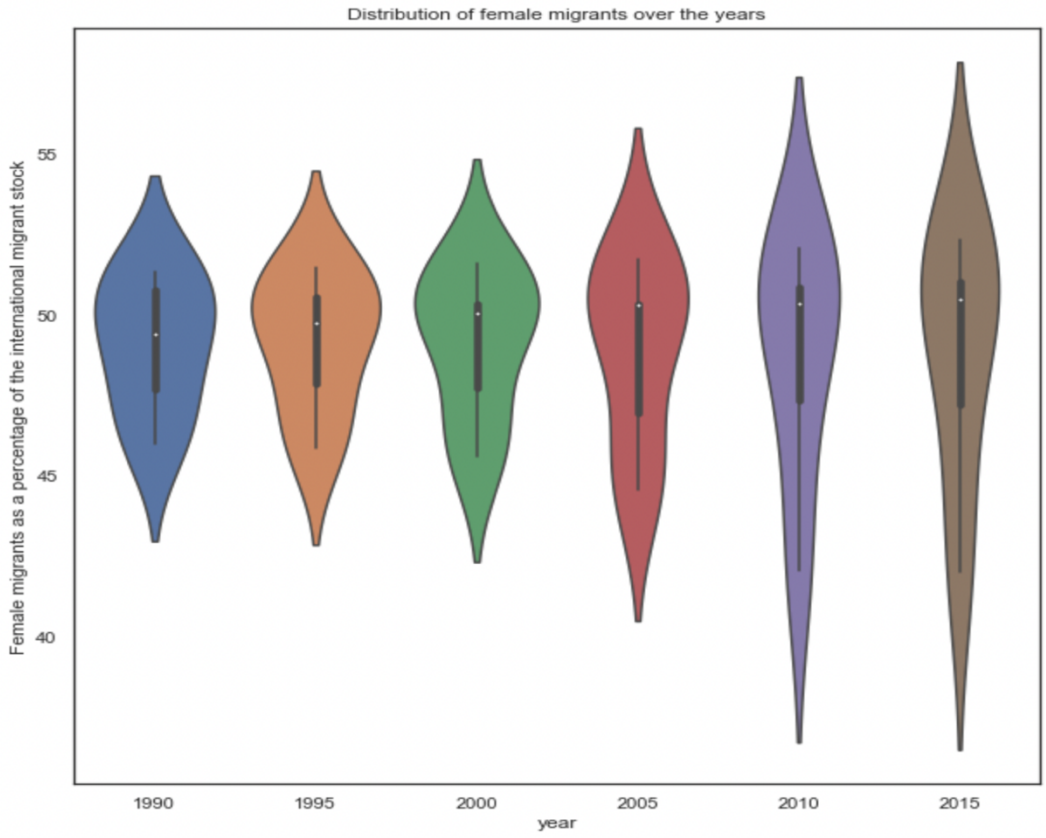

Figure 4

As we can see in figure4, percentages of female migrants on total population are getting bigger over time.

Table 5 - Annual rate of change of the migrant stock by sex and by major area, region, country or area, 1990-2015

Using Tufte's principles of visualization:

well-designed presentation of data of substance, statistics and design

For table5, I'm trying to use barplot to illustrate the 'Change of migrants over the years' by regions. I only use values under 'both sex' column to analyze and group them by regions.

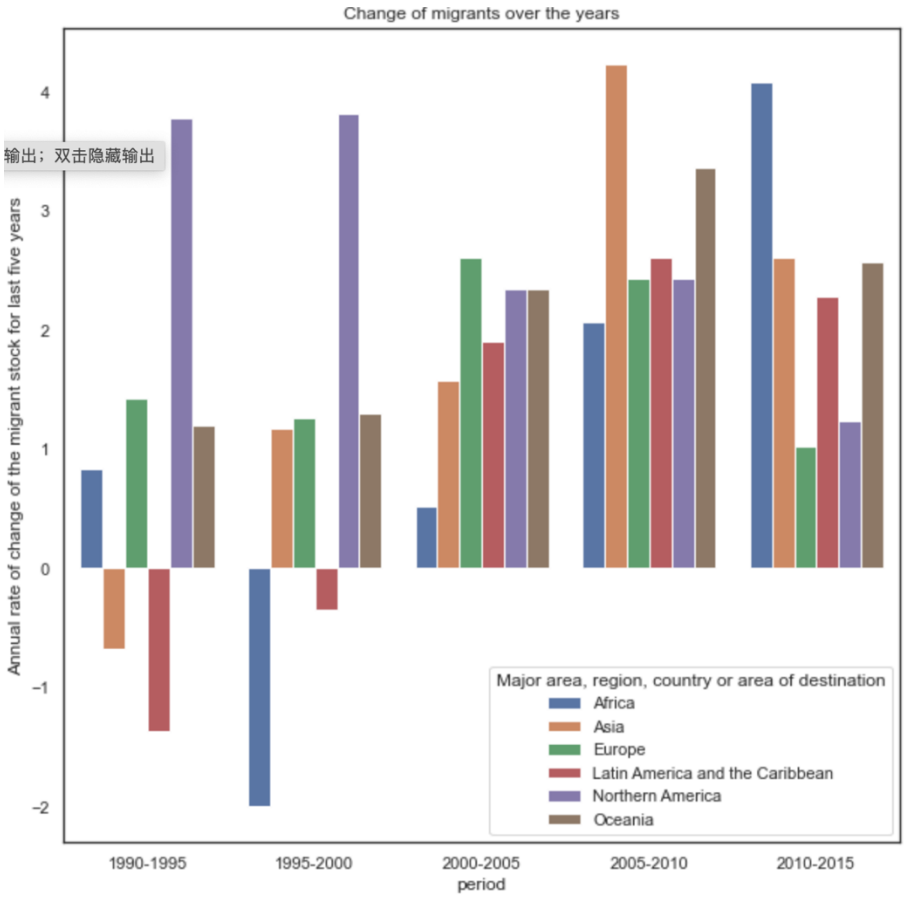

Figure 5

As we can see in the figure, there is a major negative decrease from Africa on annual rate of change during period from 1995-2000. Something may happened on Africa during that time and I just don't know yet.

Table 6 - Estimated refugee stock at mid-year by major area, region, country or area, 1990-2015

Using Tufte's principles of visualization:

the greatest number of ideas in the shortest time with the least ink in the smallest space

For table 6, I use pie to illustrate 'Compariosn of refugee stocks between major areas for 2015'; lineplot to show 'Trend of the refugee percentages' and barplot to represent 'Change of refugee over the years'. Those are the visualization tools I've already used in the previous tables.

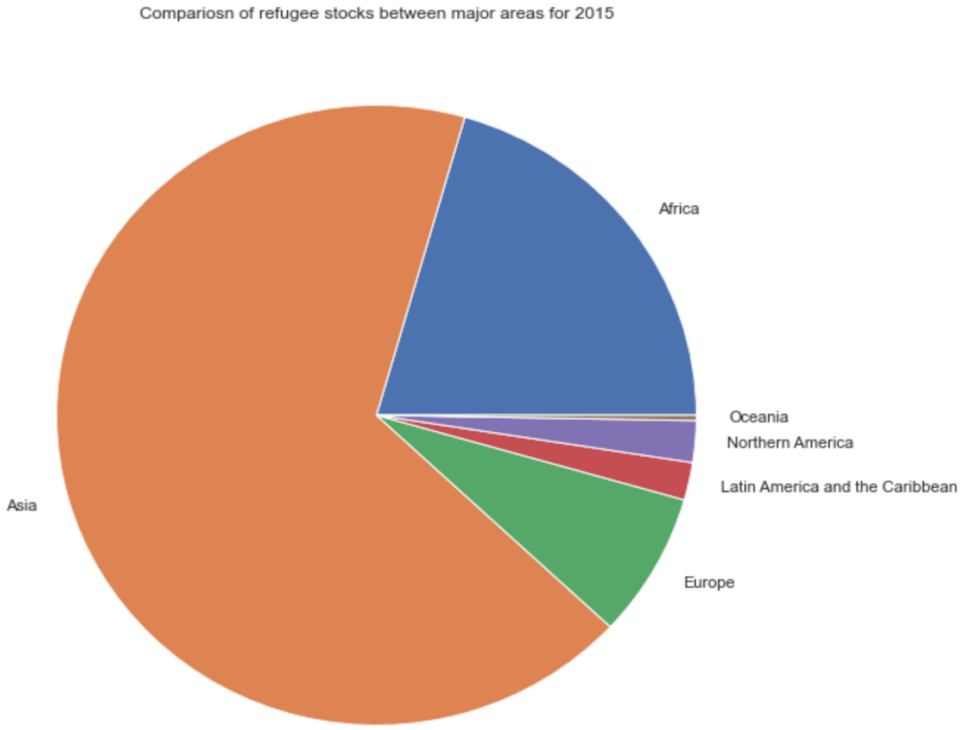

Figure 6

From gigure 6, we can see the largest estimated refugee stock in 2015 is in Asia.

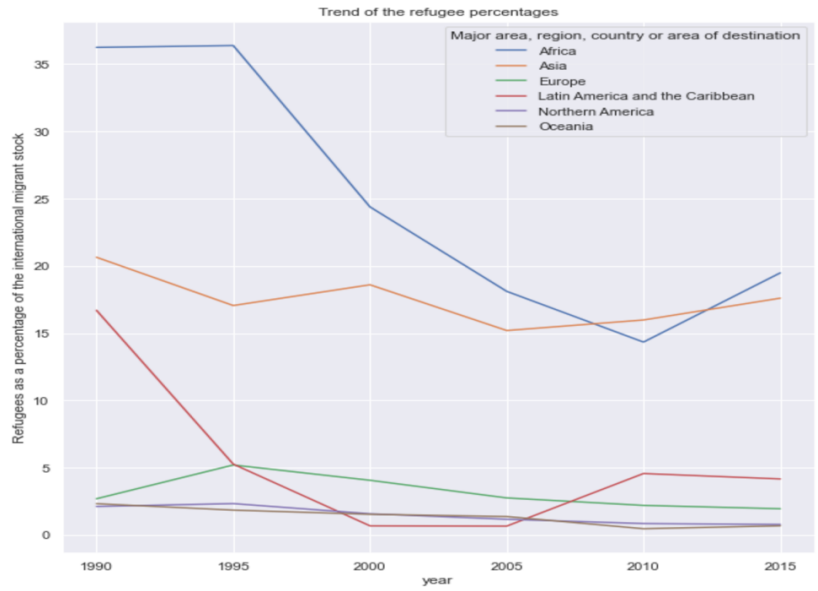

Figure 7

From figure 7, we can see Africa has almost the highest percentage of refugees of international migrant stock over time.

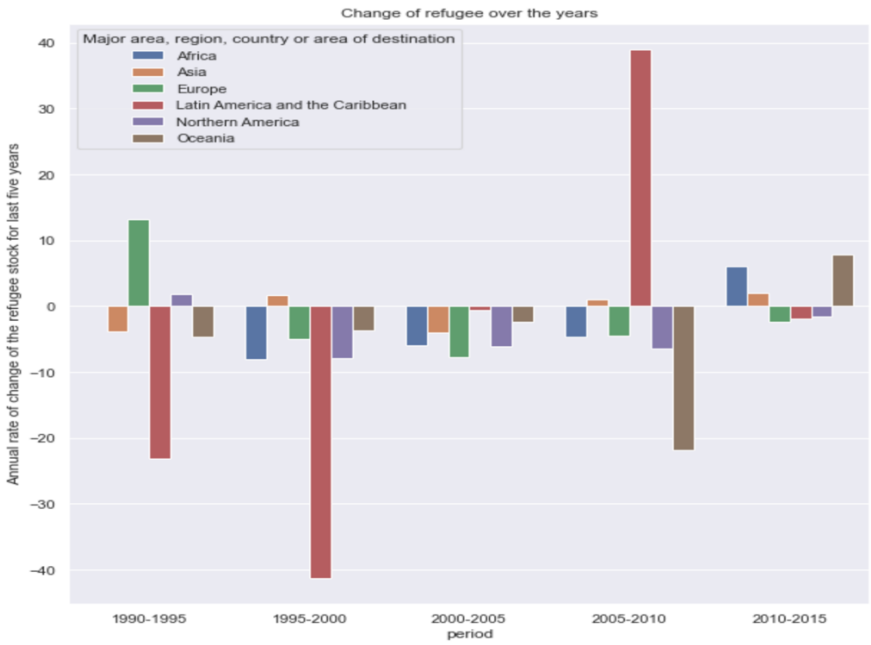

Figure 8

From figure 8, we can see Latin America and the Caribbean has the largest change on annual rate of change of the refugee stock.

Conclusion

After conducting analysis of *Trends in International Migrant Stock: The 2015 Revision* revised by Department of Economic and Social Affairs from UN, we can conclude the following findings:

- ✧ As globalization proceed, the number of international migrants is getting bigger.
- ✧ Asia accounts for the largest population and its trend of growth is the biggest.
- ✧ International migrant and refugees situation is largely different by regions all over the world with no obvious relation by genders.