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Tokyo Wards Visualization: <http://melovett2013.github.io/>

Code and data: <https://github.com/melovett2013/melovett2013.github.io>

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My final project is an interactive visualization, designed to show how Tokyo’s 23 wards differ in population, population density, percentage of commuters to other municipalities, traffic accidents per 100,000 persons, and taxable income per tax debtor over a period of thirty years. It functions by drawing the wards on a map of Tokyo, coloring each one via a scale representative of its value for a selected category. Similarly, clicking on a ward reveals its name and important districts within it. By representing the data in this matter, the visualization not only shows how each ward compares to another, but also how the core of Tokyo is spatially divided with respect to this data. Similarly, this tool serves to further demonstrate information about Tokyo learned in class, examples of which I will outline below.

Firstly, however, I will describe the design process and, succinctly, the methodology behind the coding. I focused on Tokyo’s wards since, as they are Japanese municipalities, there is readily available data starting at 1980. When choosing the five datasets that the visualization ultimately utilizes, my methodology was dictated by a few thoughts: what data is most important regarding a city, particularly based on what I knew about Tokyo from our class. Areas of cities are normally described by their population, the income of their residents, and crime rate: this led me to choose population, population density, and taxable income per tax debtor. Because the crime rate data was only available for 2005, I selected traffic accidents per 100,000 persons instead. Similarly, Tokyo is known for having an extensive railway and subway network, the most used daily in the world, so I decided to display percentage of commuters to other municipalities.

When planning the visual design, I knew I wanted a map of the wards, as this would allow one to see Tokyo’s inner city’s spatial layout. I then had to think about how I would show differences in value through the wards’ polygons. There were several options: opacity, hue, or tone. I went with tone, so that relative difference could be seen by contrast and so each category could be easily differentiated, as they would be different colors. I also had to decide the structure of the timeline. For some of the datasets, years between 1980-2010 were missing. I could edit the timeline for each year, resetting to the earliest year available, on switching categories, but then the user could not compare categories for a specific year besides this earliest one. So my final choice was to have the timeline and year remain consistent upon switching categories and if data did not exist for this year, the wards would fill in grey. The play button, however, just shows the animation for the years where data is available.

This visualization is coded in “Javascript”, mostly using the libraries “leaflet.js”, “D3.js” and “jQuery.js”. It operates by initially storing the data in variables. A map is then loaded on the screen centered at Tokyo, and the wards’ polygons are drawn on the map via a function that converts latitude and longitude into x and y coordinates on the screen. The timeline is placed on the screen as well, and it operates by calling a function to recolor the polygons when the year is changed. The “play” button runs this function as well consecutively after 400 milliseconds for each year available for the selected category. Several functions exist that operate when a button to change categories is selected: they work in the following way: if population is selected, the code goes through the population data, for each ward it selects the corresponding polygon and its new color based on a scale, it then animates from the old color to the new.

Through studying the visualization, one can see patterns that are reflective of information learned in lecture and the readings. This is especially demonstrated in the taxable income per tax debtor display. From the period of 1985 to 1990, one sees a significant increase of the taxable income per tax debtor in all wards. Such seems reflective of the Japanese asset price bubble, which lasted from 1986 to 1991. One then perceives a visible decline especially in the wealthier areas of the city from 1990 to 2000, indicative of the bubble’s collapse. Additionally, from 2000 to 2010, there is significant increase in income in Minato-ku. As Minato-ku’s description dictates, the ward contains the district of Roppongi. This visual therefore mirrors the information presented in Cybriwsky’s *Roppongi Crossing*, as we see the effects of high-end condominium developments and their wealthy inhabitants.

The visualization also points to information that would be interesting to study in further depth. By comparing the maps for population density and traffic accidents, one notices that the Chiyoda-ku, located in the very center, has significantly more traffic accidents despite the lowest population density for all the years. A particularly high population commuting to Chiyoda-ku potentially causes this or perhaps Chiyoda-ku has unusually unsafe roads and crosswalks. Another noteworthy trend is how, in the wards with highest percentage of commuters -which happen to be the western wards-, this percentage decreases significant from 2005 to 2010. If one studies the individual populations with respect to these wards, one sees that it grows slightly. Therefore, the decrease in commuters might be reflective of the fact that the people moving to these areas are working there as well, but, more generally, that there may be an increase of job opportunities in these areas. Still, such conclusions are just speculative and more research is warranted.

The above comments show some of the findings that the visualization highlights. While the changes and comparisons shown may be subtle -30 years is not a very long period of time-, I found that these nuances made it more interesting as they challenged me to think of explanations; such findings are not easily explained by well-known facts such as an economic recession. I hope this tool proves to be just as informative and captivating to others.

Works Cited:

Data: <https://www.e-stat.go.jp/SG1/chiiki/CommunityProfileTopDispatchAction.do?code=2>

Tokyo Polygon Data: <https://github.com/utisz/compound-cities/tree/master/tokyo>