City of Seattle Employees' Hourly Wage Data Visualization

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IMT 561

I. The data

In this report, I explore a dataset of the hourly wages of every employee of the City of Seattle (updated as of December 26, 2020). The dataset can be accessed here: https://data.seattle.gov/City-Business/City-of-Seattle-Wage-Data/2khk-5ukd

This CSV file contains 11,693 entries with five fields:

- Department: The department where the City of Seattle employee works. Examples include "Information Technology" or "Police Department".
- Last name: The employee's surname.
- First name: The employee's given name.
- Job title: The employee's job position. Can range from "Cashier" to "Pol Ofcr-Detective" and even "Mayor".
- Hourly rate: The amount the employee makes per hour.

The categorical variables that are most relevant for comparison are department and hourly rate. Below is a sample of the dataset:

II. The audience

Various audiences could benefit from learning from this data set, including:

- Current employees of major American city government
    - Assumptions and prior knowledge
        - Current employees are aware that their wage data (and that of their colleagues/superiors/subordinates) is public information.
        - This includes not only manual laborers but also those that hold important offices, such as the mayor or police chief.
    - Expectations from visualizing this data
        - Maintain their expectations of government integrity by viewing their own wage data
        - Learn about their colleagues' wages in order to potentially negotiate for a raise or promotion
- Prospective employees of major American city government
    - Assumptions and prior knowledge
        - Prospective employees are aware that open positions exist and (if they've done their research) that people with similar positions have publicly available wage data.
    - Expectations from visualizing this data
        - To view the existing wages for the position they apply for, in order to possibly negotiate a salary commensurate with their experience
        - Compare government wages for a position with similar jobs in the private sector

- Any resident of Seattle
    - Assumptions and prior knowledge
        - Seattle residents want to hold their leadership accountable, and are interested in the lives and policies of those who affect their daily lives
    - Expectations from visualizing this data
        - Provide an overview of Seattle government official wages (which are paid by taxpayer dollars)
        - Be able to focus on wage data for certain departments and/or important government officials who should be representing their interests when forming legislation

III. The questions

This data set can help answer certain questions that various audiences have:

- Current employees of major American city government
    - Is my employer, the City of Seattle, paying me as much as they should be?
    - What are my colleagues (who may have similar skills or be in a position of power over me) being paid? Based on the data, should I deserve a higher pay?
- Prospective employees of major American city government
    - How much are people doing the job I want getting paid? Can I negotiate for a salary I deserve based on this info?
    - How much would I get paid if I worked this job for the government as opposed to a private company?
- Any resident of Seattle
    - How are the different city departments organized? How many people work in each department?
    - Are my elected representatives representing my interests? Are certain departments doing the work they should?

IV. The ethics

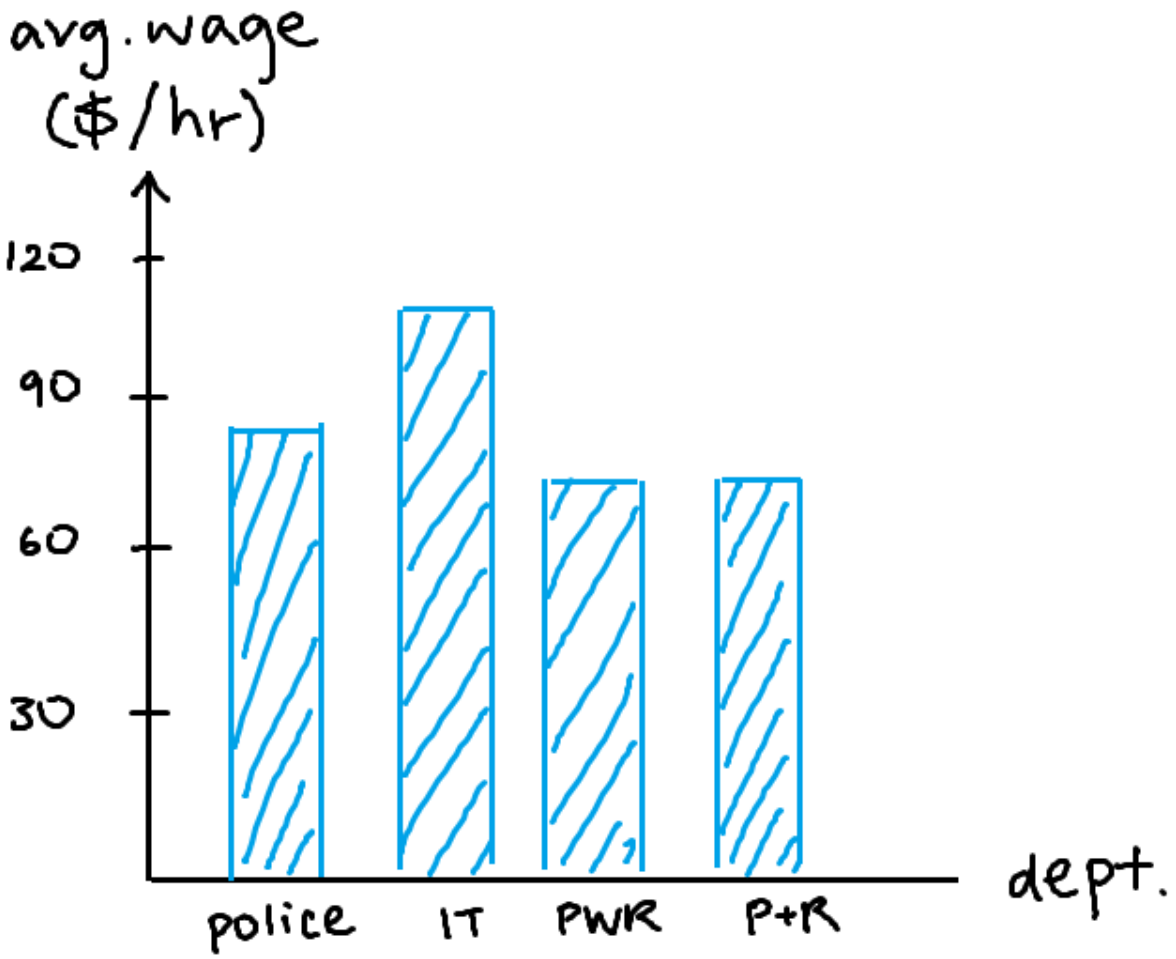
Privacy and reputation: Although this information is public knowledge, many people named in the dataset should reasonably expect to not be embarrassed; for example, it would be mortifying if I named a specific government employee with a very low hourly rate. On the other hand, elected officials should be placed under more scrutiny as they majorly shape the policies that affect the daily lives of Seattle residents. If I decide to display any specific names associated with certain data points, I will take steps to anonymize them within reason (for example, with initials only). Elected officials should have their full names (on the dataset) displayed, since they are public figures.

Normalizing wage discussion: Many companies consider openly discussing salaries a taboo and heavily discourage it. Despite this negative culture, in the United States it is protected by federal law (National Labor Relations Act, section 7) to discuss salaries with coworkers, whether in person or on social media. I create this data visualization with the hope that it will foster discussion about pay equity in and outside of the workplace, and that it will encourage employees in both the public and private sectors to seek a wage that reflects their skill and financial need.

V. The sketches (sketches do not reflect actual data)

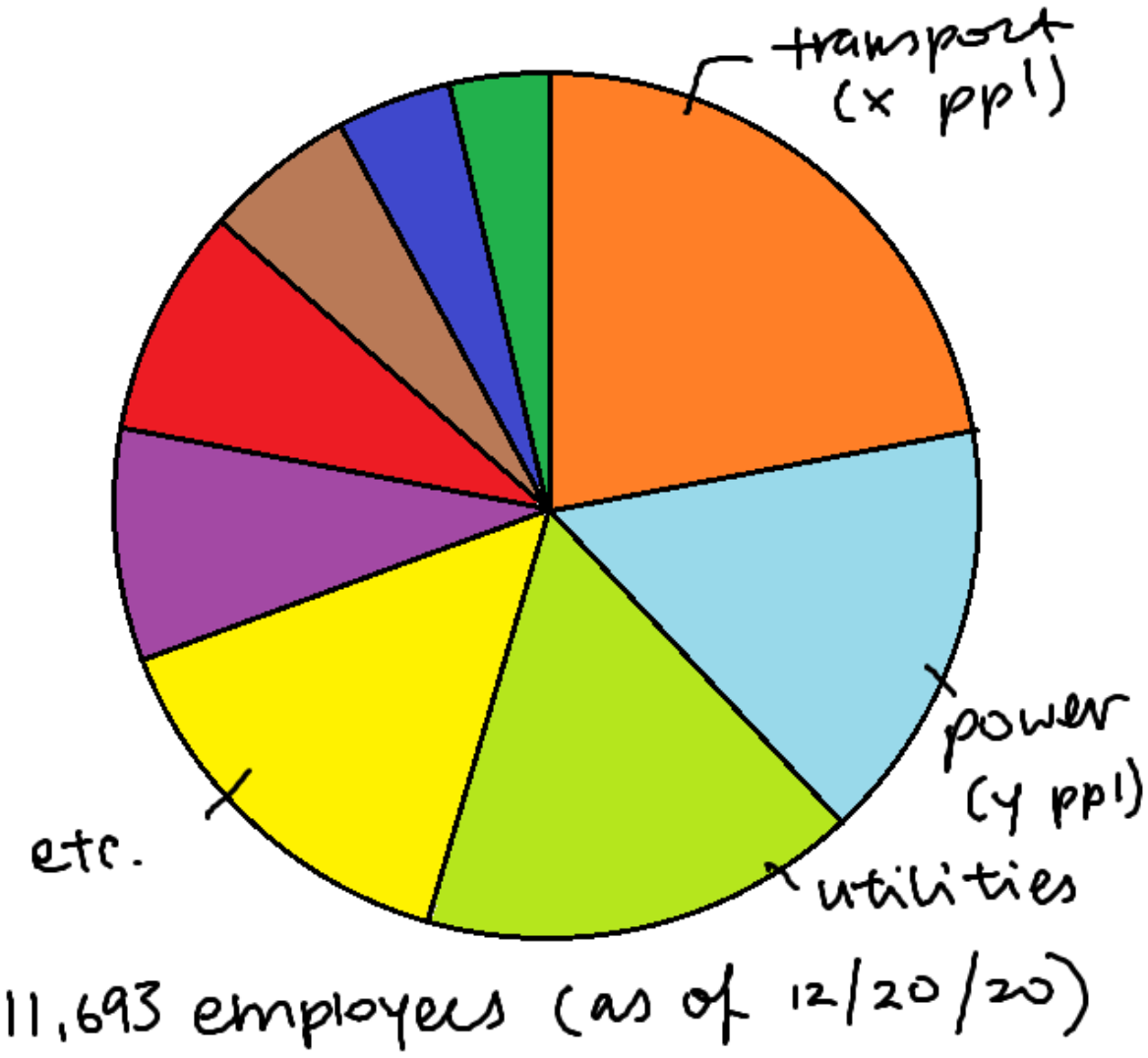
Option 1: Bar chart

In this format, I wanted to show how different departments' average hourly wages differed. I would expect to see departments with more skilled workers (such as the IT department) or with more funding (such as the police department) have a higher average wage than departments with more manual laborers. Bar charts are easy for the average person to understand, but my worry with this format is that it will not reflect the size of the department, which can artificially increase or decrease the size of the bar.



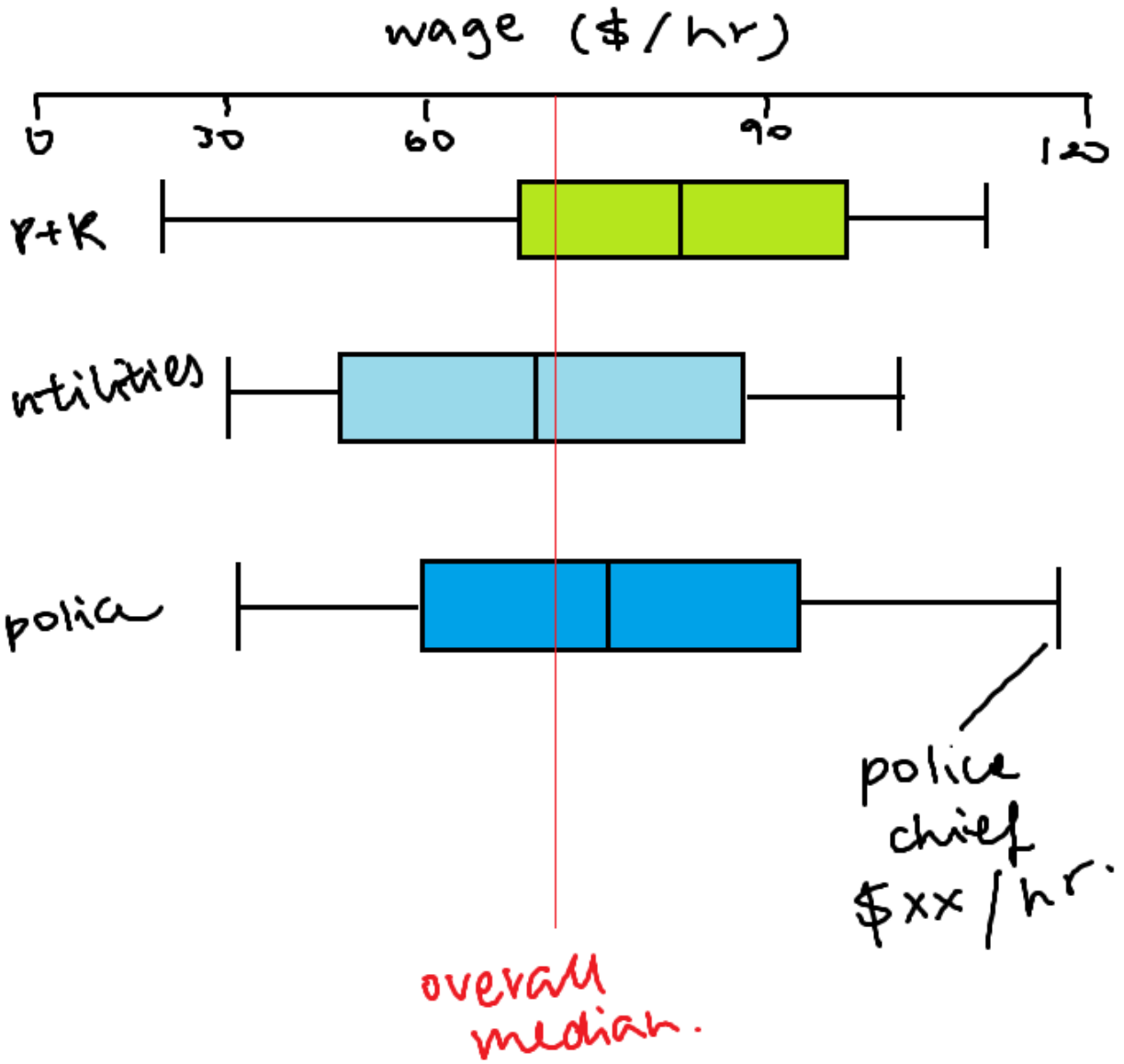
Option 2: Pie chart

In this format, I wanted to explore the percentage of the body of the City of Seattle workforce that corresponds to each department. I would expect departments with more manpower (such as the police, or utility technicians) to occupy larger sections of the circle. I also added a footnote with the total size of the workforce as well as notes showing how many people are in each department so that readers can also have a textual reference to the size of these departments. Pie charts are also straightforward for readers to understand, but the main problem with this format is the opposite of the bar graph: this shows the size of the workforce, but not its monetary value. An ideal data representation would be able to balance both.

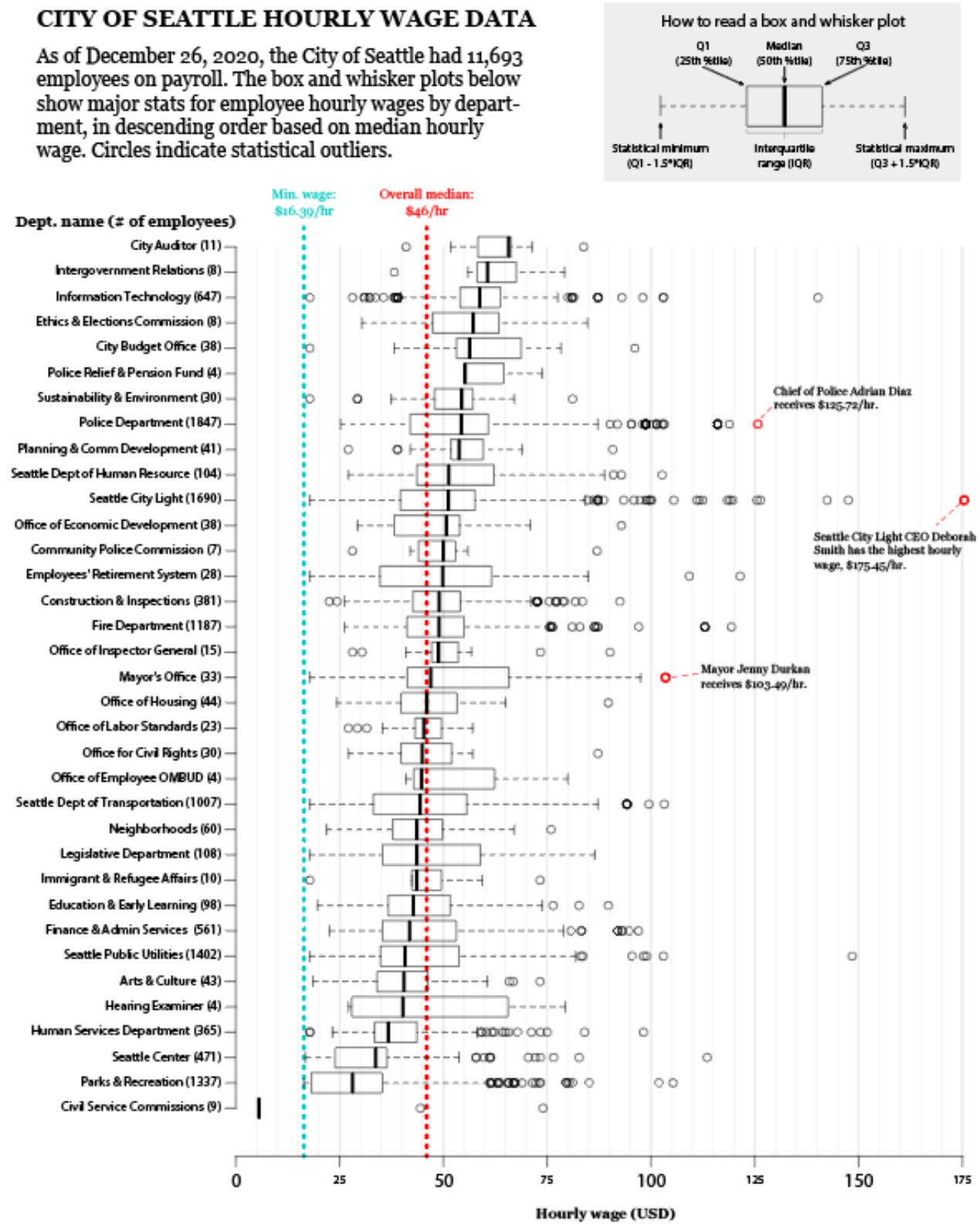


Option 3: Box and whisker plots

With this graph format, I again wanted to explore statistically significant wage values by department. Instead of having a single average, the box and whisker plots instead included statistics like the medium, 1st and 3rd quartile, minimum, and maximum. I added a feature to sample significant employees' hourly wage amounts, such as an important elected official. Additionally, I tried using a thin red line to show the median wage among all employees in the city. Like the bar chart, this data representation format makes it hard to demonstrate the size of the department, but I hope that showing quartile values will help mitigate that issue somewhat. Another problem is that it is a little less accessible than easily recognizable formats like bar charts or pie charts.



VI. The visualization



I decided to proceed with option 3 (the box and whisker plot) since the extra statistics it showed were worth examining, despite the learning curve needed to interpret the graph. I initially was skeptical about not being able to show the size of each department (some are tiny, while others are enormous); in the end, I decided that if I couldn't show it, I would just tell it. Next to each department name is the number of people employed by that department. I also ran into the problem of the box and whisker plots' learning curve, especially as I sought feedback. In the first draft, I added a textual tutorial for reading a box and whisker plot, which I then changed to a visual tutorial on the advice of the readers I got feedback from.

This visualization went through two iterations. Below is some of the feedback I received and how I addressed it (or didn't):

- **Adding a reference line for minimum wage**

My readers wondered why some employees were getting paid a pittance compared to high earners like the Seattle City Light CEO and the Chief of Police. I noted that the minimums probably referred to the city minimum wage of $16.39/hr; they then suggested adding that onto the graph.

- **Sorting y-axis by median**

The departments were originally ordered in reverse alphabetical order. My readers noted that this order seemed random and suggested ordering them based on median hourly wage or even department size. Since the main purpose of this visualization is to compare wages by department, I decided to sort the departments in order of the median.

- **More vertical guidelines**

One reader complained that having to scroll up and down the document to match data points with their value was tedious. They suggested adding more light grey vertical guidelines so it would be easier to match data points with their values. I originally tried putting some light grey x-axis values on the top, but it became cluttered, so I removed it.

- **Discuss Civil Service Commission outlier**

The readers were curious why the Civil Services Commission employees are paid less than minimum wage. I went on the department website to do some research, but could not find a suitable explanation for this major outlier. If I were to work on this visualization more in the future, I would do more research on this and add a note explaining this.

- **Other points of interest**

One reader suggested more red notes explaining data points of interest, such as for the highest paid earner in the Information Technology department. I decided not to include more, since I felt that more notes would just clutter the graph, and the points of interest were truly important (the highest earner by hourly wage, the mayor, and the chief of police who oversees the largest department in the city).

- **Showing department size through other forms of visual encoding**

One reader suggested other ways I could visually encode the size of each department, such as color saturation or a sort of “heat map” way to show what specific job positions were most common. I ultimately didn’t have time to include it, but if I were to iterate on this in the future, I want to explore various ways to show department size.