Tableau – Salary data set

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Salary data set description

When a US company wants to hire someone from outside of the United States for a technical position, they have to file an application to the United States government to get a green card or visa for the foreign applicant. These applications allow the US government to track who is entering and leaving the country for work-related reasons and ensure that immigrants are neither being taken advantage of nor causing adverse effects for U.S. workers. To ensure equity for US and non-US workers, companies have to state how much they are planning on paying the employee every time they submit a visa or green card application. They also have to state the average amount an employee with similar skills and background typically gets paid for the same position, a figure called "the prevailing wage." This publicly available data provides a unique view into what types of salaries you might encounter for different data–related jobs in the US.

Source: the original data was compiled by the US Department of Labor's Office of Foreign Labor Certification (http://www.foreignlaborcert.doleta.gov/performancedata.cfm

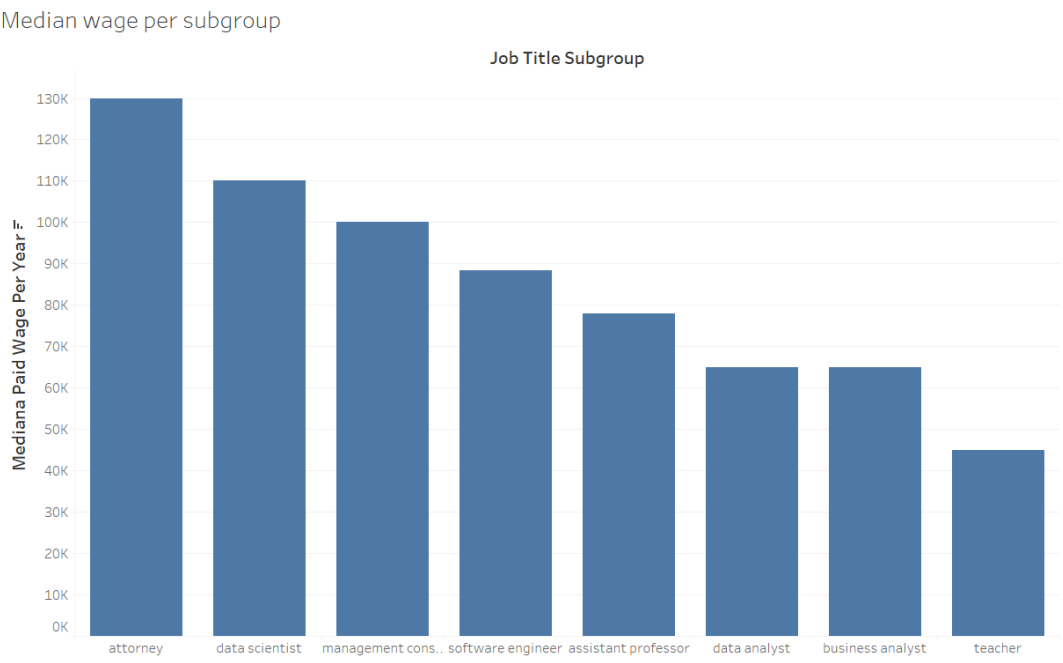
1 – Change data types (if needed)

Looking at the data set, we can notice some wrong data types. We can change data types directly from Tableau.

- **Case received date**: string → date
- **Decision date**: string → date
- **Prevailing wage submitted**: string → number (decimal)
- **Experience required**: string → number (whole)
- **Paid wage per year**: dimension (discrete) → measure (continuous)
- **Prevailing wage per year**: dimension (discrete) → measure (continuous)

2 – Plot median “paid wage per year” for each “job title subgroup”

- **Dependent variable**: paid wage per year (rows)
- **Independent variable**: job title subgroup (columns)

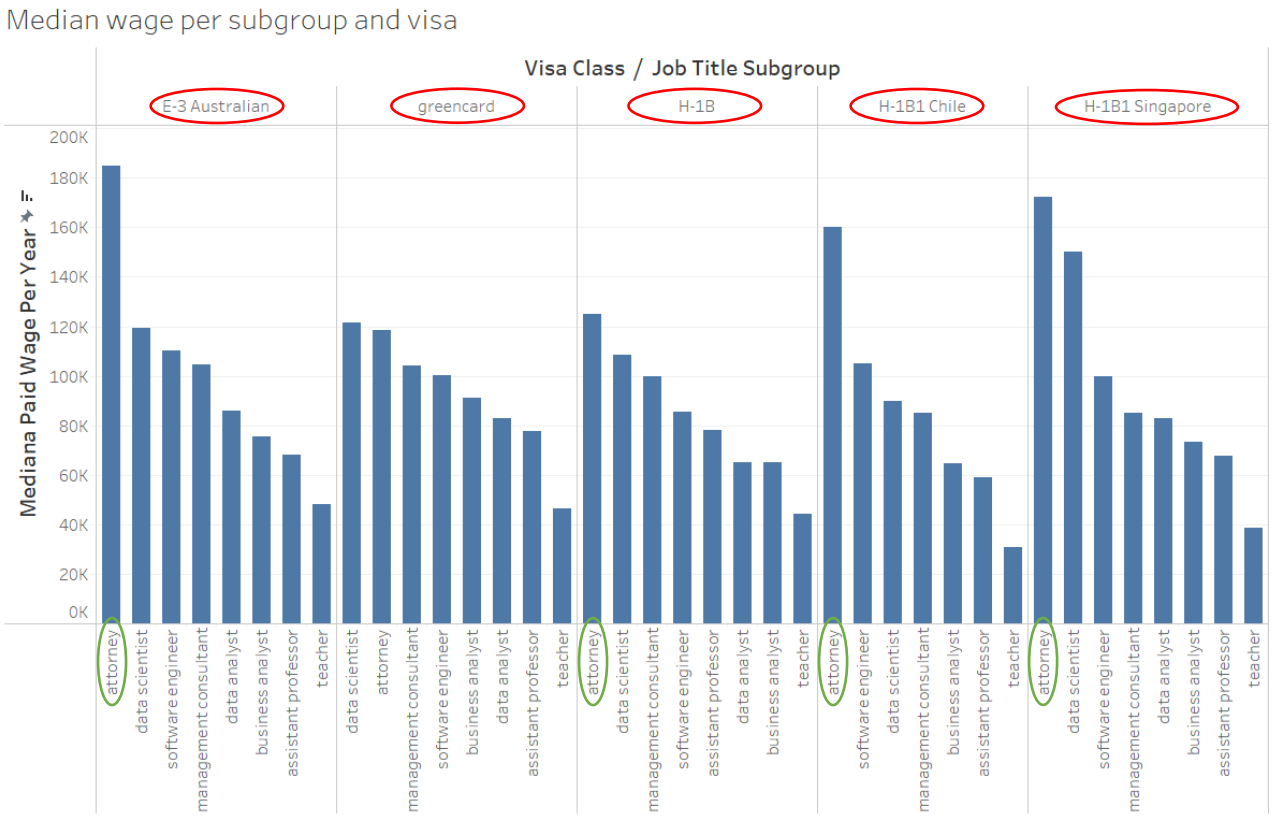


3 – Make a rational hypothesis an verify it (can be correct or incorrect)

Knowing that green cards cost more than visas, I can make the following hypothesis:

"A company will pay for a green card only to hire extremely competent people, therefor wages of people having a green card will be higher with respect to wages of people having visas."

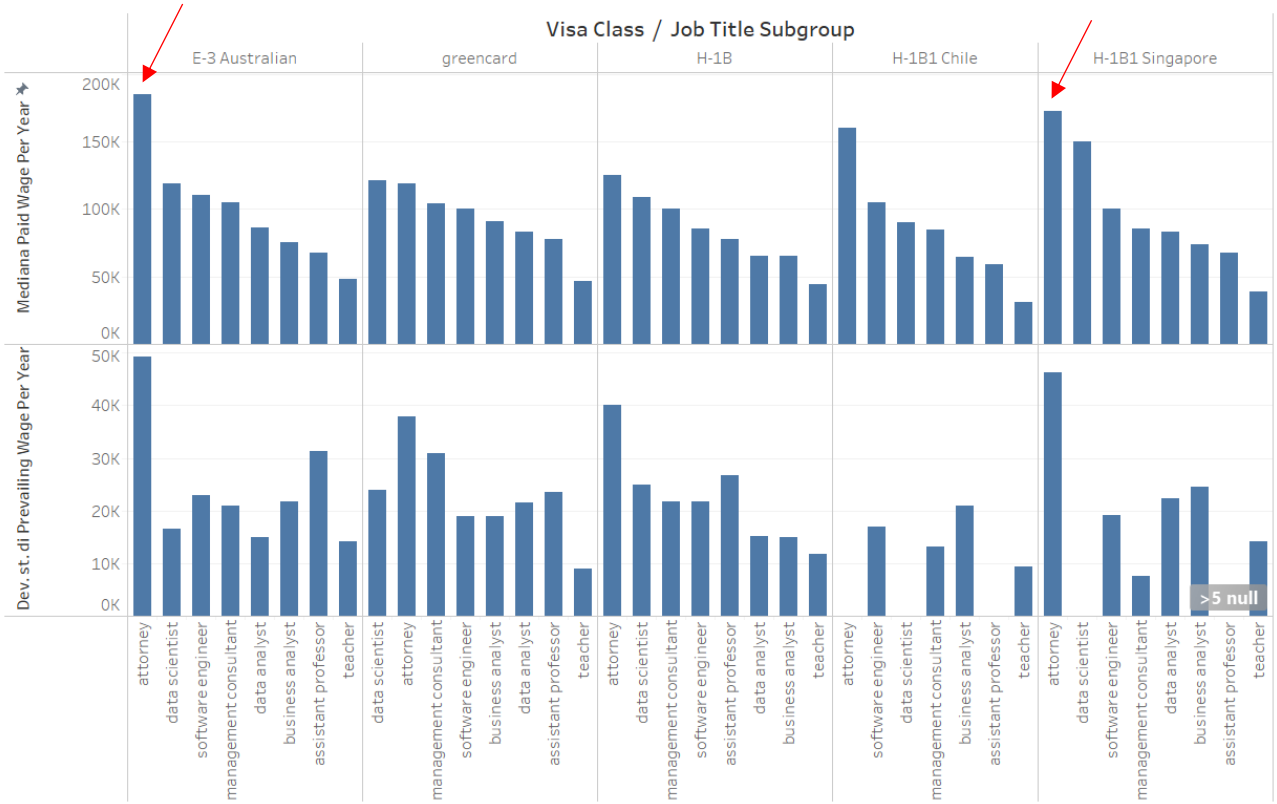
To verify my hypothesis, I plot the median paid wage for job title subgroup and visa class.



Looking at the plot, I can say that my hypothesis was not correct: in most of the cases, attorneys are the ones who earn the most, regardless of their visa class.

4 – Are medians reliable? How do you check medians' reliability? What else can you say?

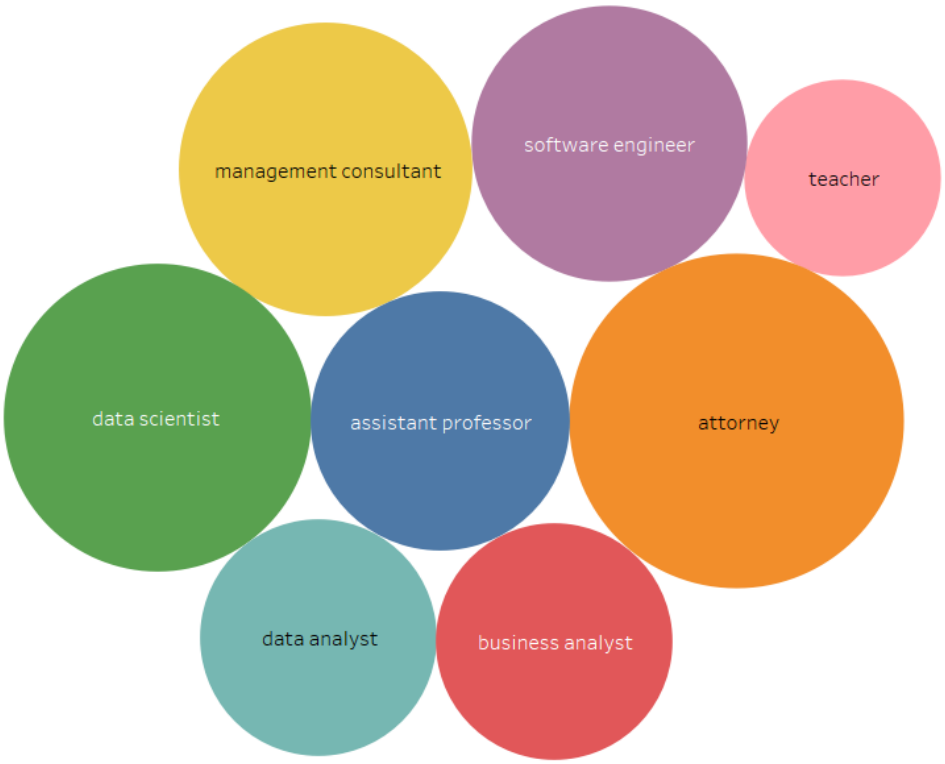
To understand if medians are reliable, we can plot and analyze the **standard deviation**. The higher the standard deviation is, the less the median is reliable.



From this plot we can notice that the highest medians are associated to the highest standard deviations, therefor those medians are not reliable. High standard deviations suggest us that **outliers** may be present.

5 – Plot median “paid wage per year” for each “job title subgroup” using bubble plots

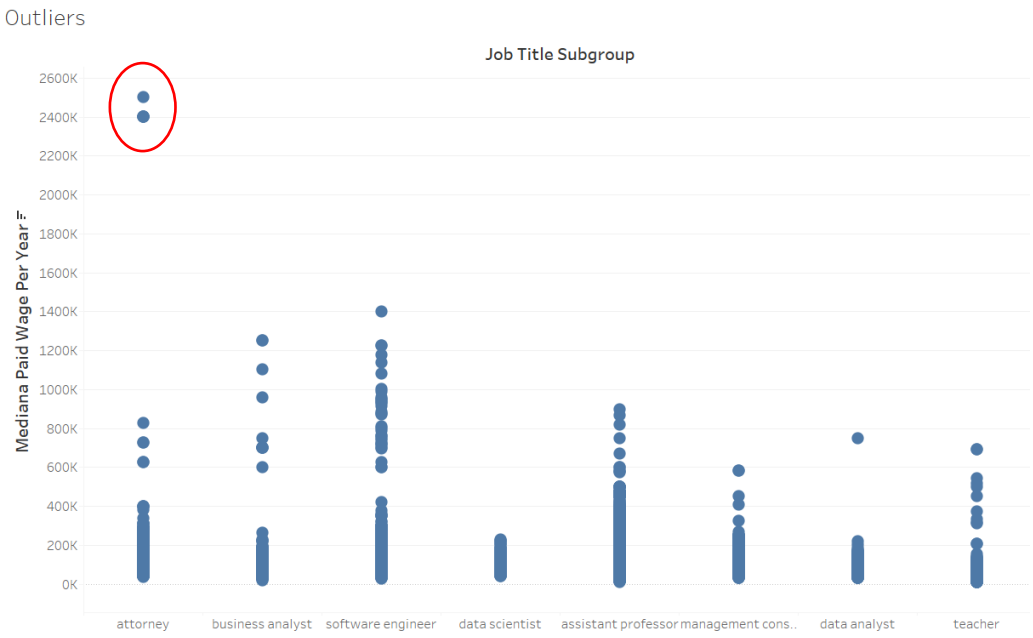
Although a bubble plot is not the best choice for this kind of query, here is the plot we obtain. Please notice that, to improve the chart readability, I have associated each job title subgroup with a different color. The bigger the bubble, the higher the median paid wage.



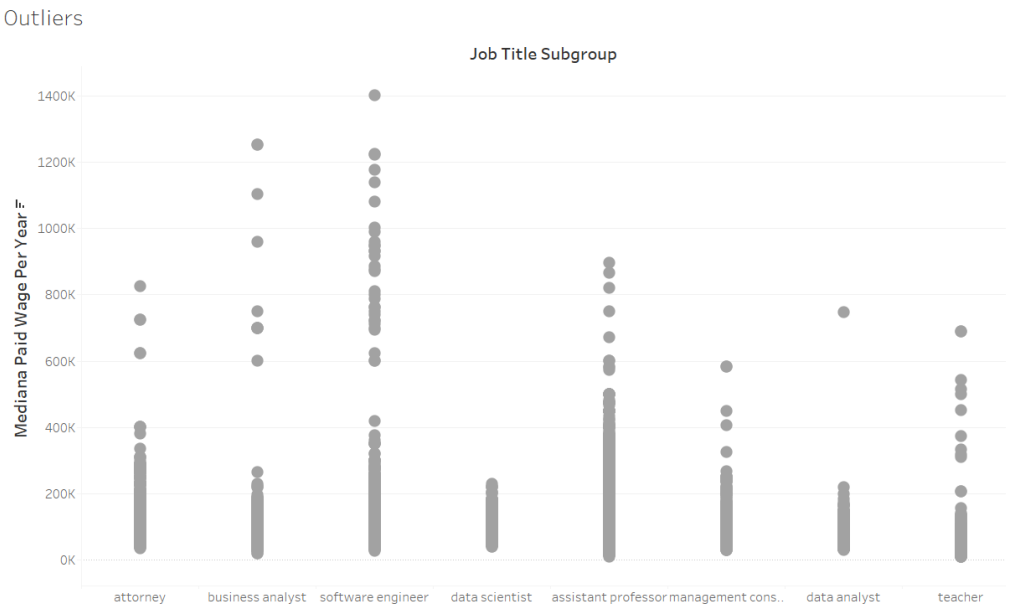
6 – Identify outliers (if present) and remove them

As we have already said, high standard deviations suggest us that outliers are present. The highest standard deviations are associated to attorneys' wages, so I expect to find outliers among them.

The best way to identify outliers is using **scatter plots** (visual inspection).



To remove outliers: add "case number" to "details", select the outliers, group by "case number", drag-and-drop "case number (group)" into filters, right click on "case number (group)", select "show quick filter", select "other" only. In this way, outliers won't be visible.



7 – Your goal is to understand if, given a certain job, the wage associated to it changes from a country to another. Please consider only the following countries: California, Washington, North Carolina, Colorado, Texas, New York, Massachusetts, Alabama, Maine.

We need to apply a filter on "Work state". The problem is that, in the data set, sometimes they use the full name of a country (ex: "California") and sometimes an abbreviation (ex: "CA"). To solve the problem:

Work state, create, group, create groups (and rename them) for those countries we're interested in.

In this way we obtain "work state (group)". We drag-and-drop "word state group" in "filter" selecting only the states we're interested in.

Note: the free version of Tableau doesn't allow exports, therefor I'm able to show only a part of the obtained plot, otherwise it won't be readable.

Looking at the plot we can say, for instance, that for a data scientist is a good idea to move from Colorado to California.

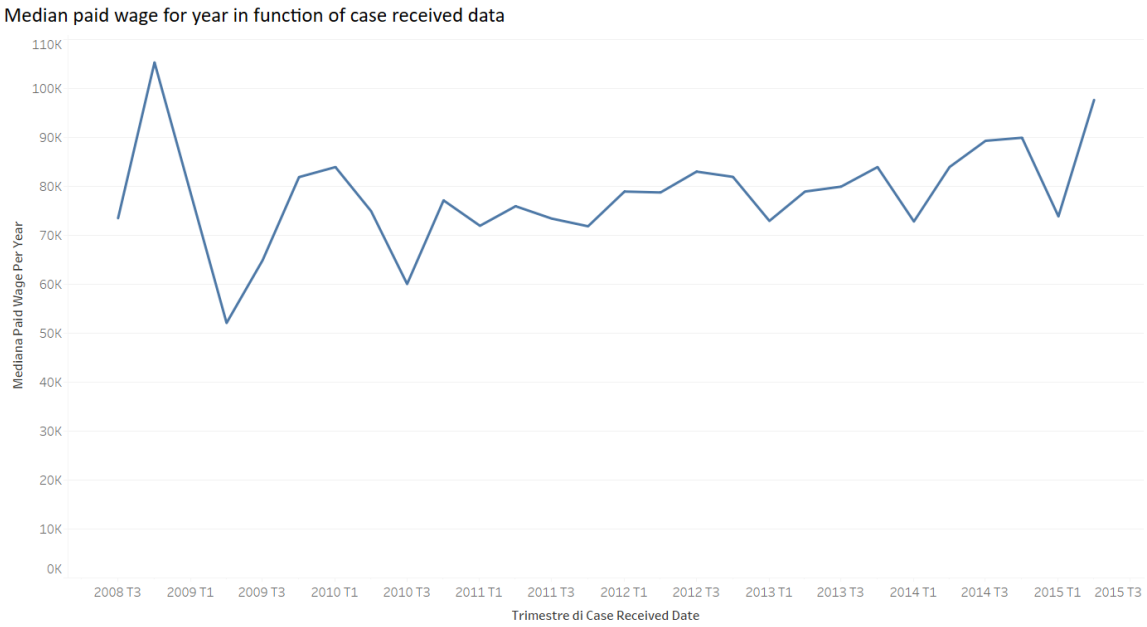
8 – Does the wage per year increase proportionally with the years of experience?

To answer to the question, we will plot the median paid wage for year in function of the case received data. So, “case received date” basically is the independent variable (column) and the median of “paid wage per year” basically is the dependent variable (row).

“Case received date” is a date and therefor is treated as a dimension (discrete variable). If we plot the median paid wage for year, we will obtain a disconnected line.

To solve the problem (and so, to obtain a continuous like), we need to treat the “Case received date” as a measure (continuous variable). To do that we drag-and-drop “Case received date” in columns, we click on the down arrow, and we select “year”. “Case received date” will change its color from blue to green: now it is a measure and lines will be connected.

The plot that we obtain is the following one:



We can say that the median paid wage per year is not significantly changed through time.

9 – Focus on data analysts:

1) **Can you say that their minimum wage is decreasing/increasing?**
2) **Can you say that their maximum wage is decreasing/increasing?**
3) **Can you say that their median wage is decreasing/increasing?**

To answer to this question, the first thing to do is to plot the minimum, the maximum and the median "paid wage per year" per "job category". Then, we drag-and-drop "job title per subgroup" on "color" in order to have data for each job title separately. Finally, we introduce tendence lines and we select only that lines that are associated to data analysts. This is the plot we obtain.

Apparently, the median wage of data analysts is increasing, the minimum wage of data analysts is decreasing, and the maximum wage of data analysts is increasing. Are these hypotheses reliable? We have to check the **p-values**. If we pass with the mouse on the lines, we can read it.

The p-value associated to the Max and the Median graph is higher than 0.05, this means that we cannot be sure of the conclusion we have we came to.

However, the p-value associated to the Min wage per year is 0.03 that is lower than 0.05, so we can say that the minimum wage per year data analysts is decreasing.

10 – Box plots: median "paid wage per year" for "year" focusing on "data scientists"

In this case we need to consider the **date** as a **discrete variable**.

- Column – Case Received Date
- Row – Median paid wage per year
- Filter – Job Title Subgroup (to select "data scientists").

Then we go to "Analysis" and we click on "Aggregate measures". This is what we obtain: