Salary Data Analysis

DS 311 | Team ANOVA:
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Dataset: US Department of Labor's Office of Foreign Labor Certification

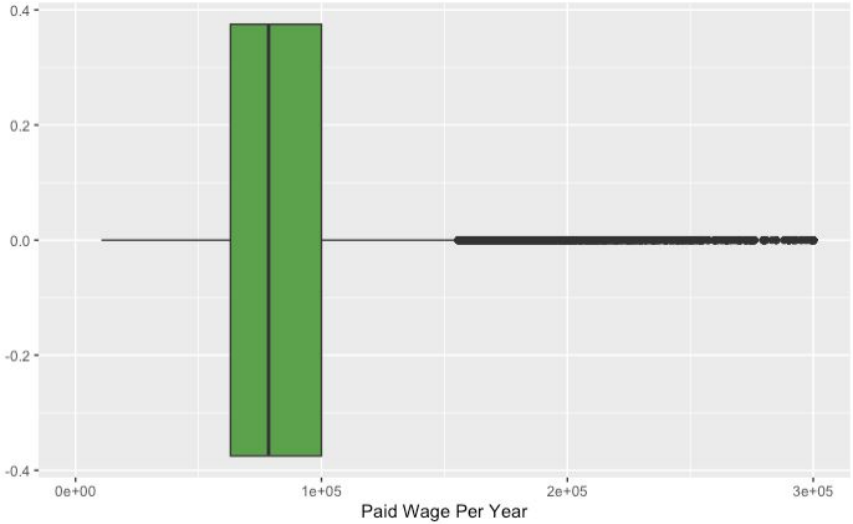
- Assembly of 167,278 records from the Labor Condition Applications and permanent resident applications from 2008 to 2015 (H1-B and specialty visas)
- Records display individual immigrant employee salaries
  - Unique view of what salary entails for data-based jobs
- Dataset Purposes
  - Tracks immigrant entrants for work-related reasons
  - Ensures financial equity of immigrant workers
  - Unique view of what salary entails for data-based jobs

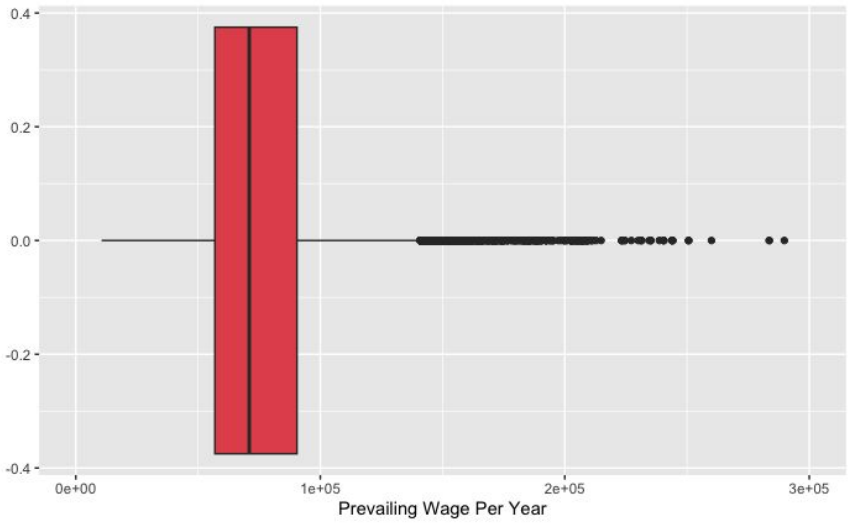
What is our KPI?

Paid Wage Per Year	Paid salary per year for an individual employee ● Accounts for “Paid Wage Submitted” and “Paid Wage Submitted Unit”

Summary Statistics

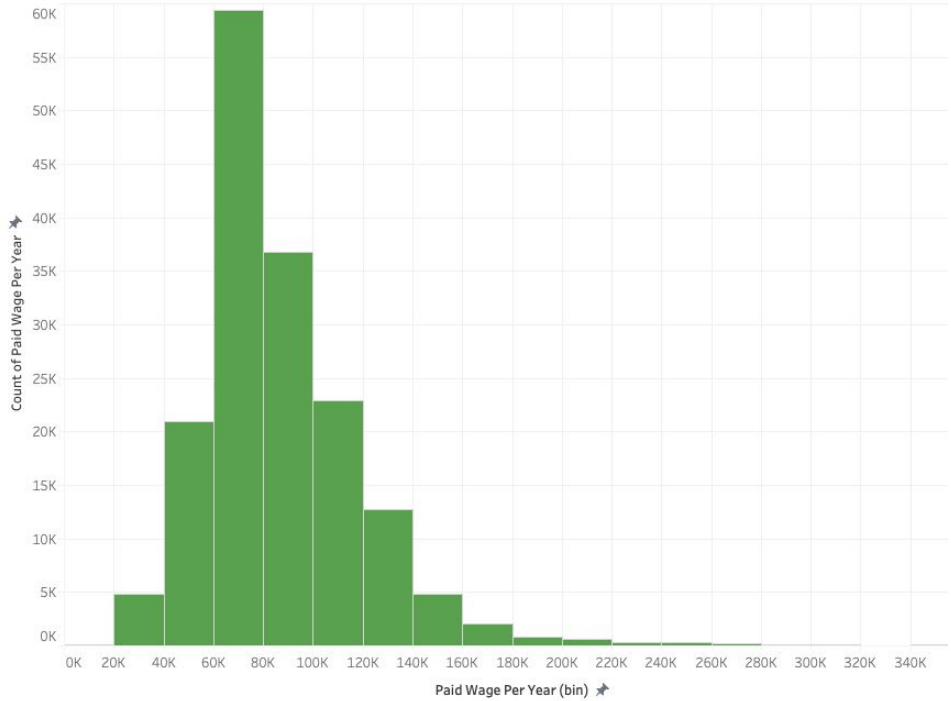
Variable	Min	Q25	Median	Mean	Q75	Q99	Max
<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
Paid Wage Per Year ($)	10500	63000	78600	85532.77	100006	200000.0	2500000
Prevailing Wage Per Year ($)	10504	56880	70928	74274.87	90459	139742.1	320000



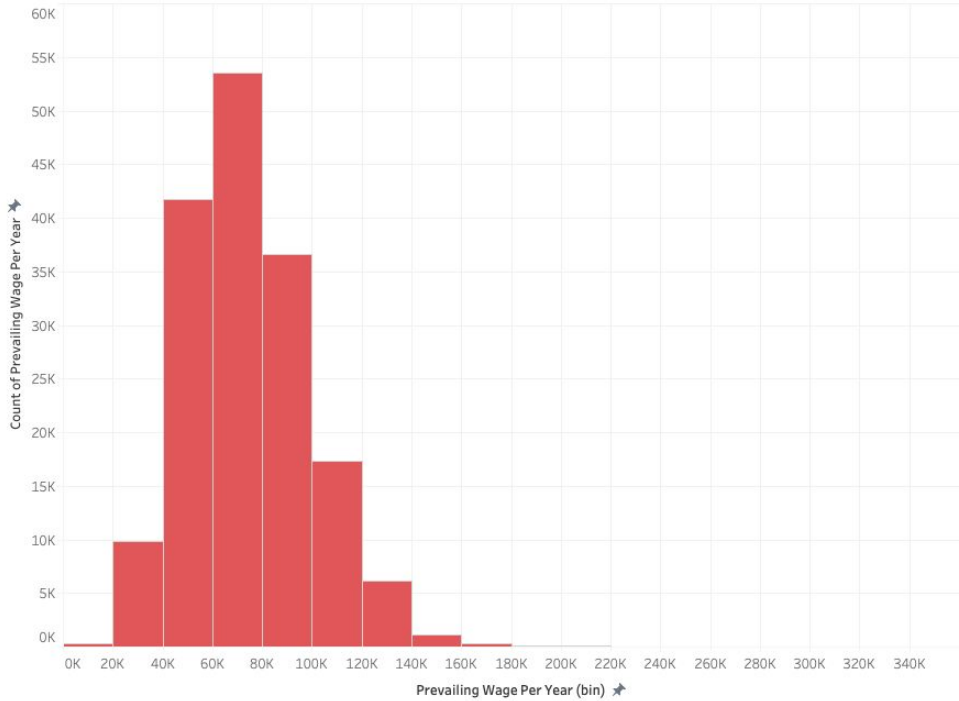


Visualization of Wage Distributions

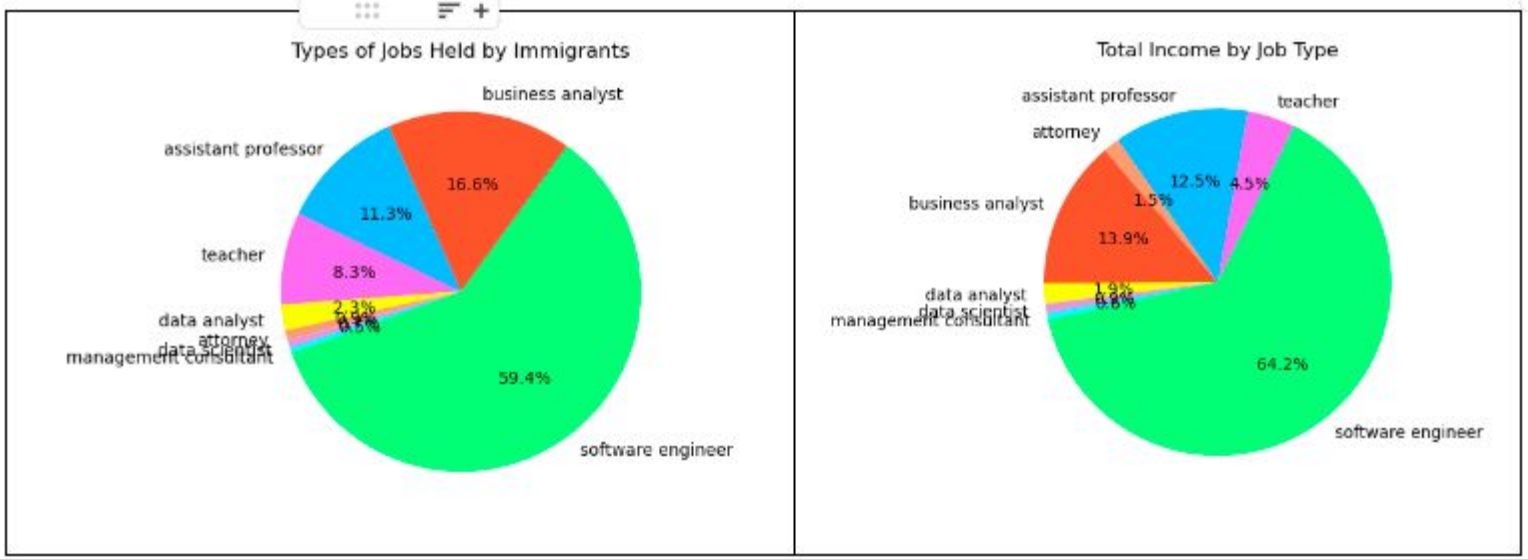
<Distribution of Paid Wage Per Year>



<Distribution of Prevailing Wage Per Year>



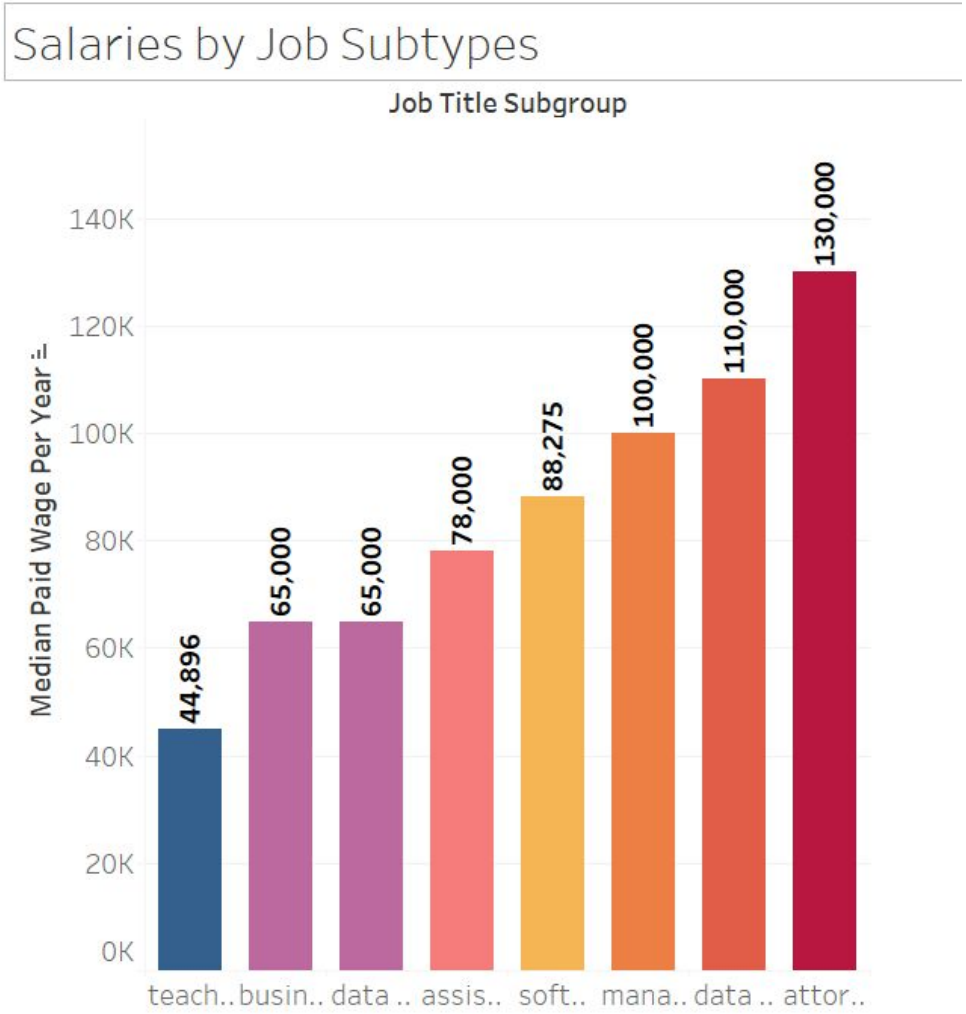
Pie Charts of Job Subtypes



Q1
Do specific sub-types of data-related jobs have higher or lower salaries than others?

1a. What are the highest median salaries by subtypes?

1. *Attorney: $130,000*
2. *Data Scientist: $110,000*
3. *Management Consultant: $100,000*



1b. Which companies have the highest salaries for those sub-types?

JOB_TITLE_SUBGROUP <chr>	EMPLOYER_NAME <chr>	AvgSalary <dbl>
attorney	HUGHES HUBBARD & REED LLP	2400000.0
business analyst	OFFICEMAX INCORPORATED	603711.7
software engineer	SIGMATEK SYSTEMS, LLC	600000.0
assistant professor	DIXIE STATE COLLEGE OF UTAH	492250.0
data analyst	INTUIT	433161.5
management consultant	BAKER BOTTS L.L.P.	350000.0
teacher	THE CHILDREN'S SCHOOL, INC.	283500.0
data scientist	NETFLIX	220000.0

1c. Does changing location change the ranking of job sub-types?

JOB_TITLE_SUBGROUP <chr>	CA_MedianSalary <dbl>
attorney	146221.5
data scientist	119800.0
software engineer	105972.5
management consultant	97446.0
assistant professor	81353.5
data analyst	75046.0
business analyst	70000.0
teacher	48150.0

JOB_TITLE_SUBGROUP <chr>	MA_MedianSalary <dbl>
data scientist	102500
management consultant	97000
attorney	93850
software engineer	88691
assistant professor	88500
business analyst	67000
data analyst	65000
teacher	48000

Conclusion: Yes!

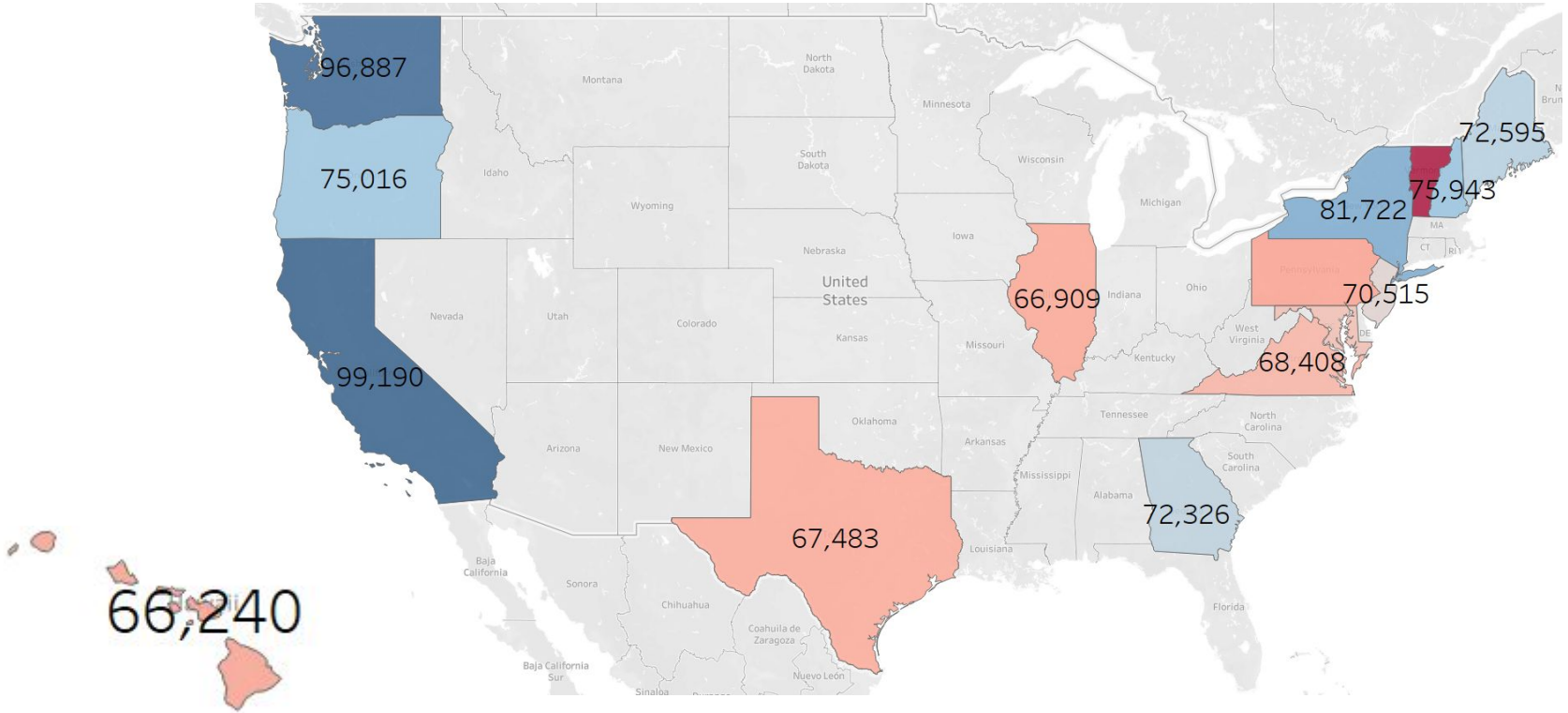
Q2: What states (of those that I am willing to move to) have the highest paying data-related salaries?

Top 10 and bottom 10 states for data jobs, ranked by average salary

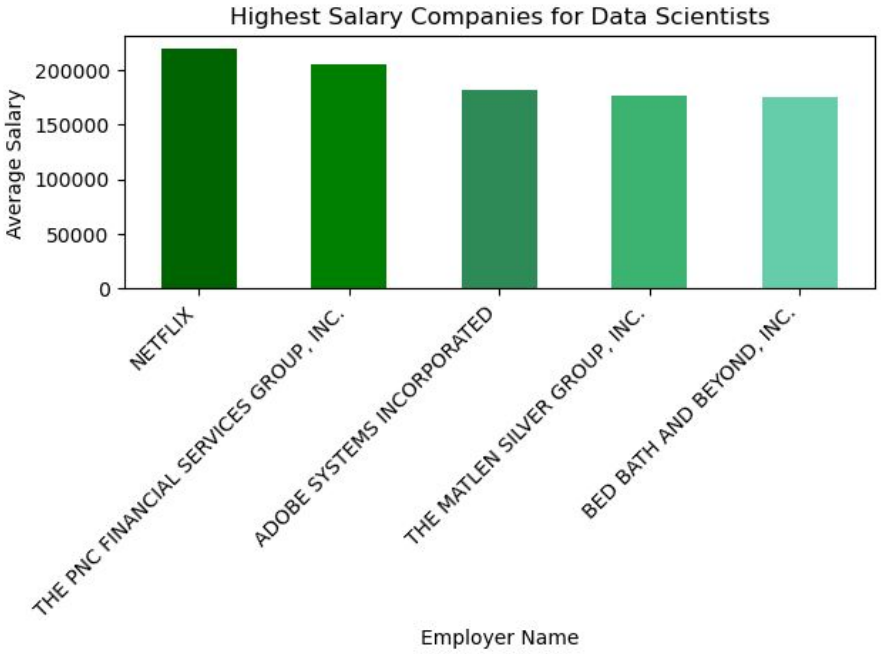
	State	Average Salary
0	California	99190.31
1	Washington	96887.08
2	Connecticut	81928.39
3	New York	81722.32
4	Utah	81707.51
5	Massachusetts	79960.73
6	District of Columbia	79758.17
7	Delaware	78561.14
8	Arizona	78219.66
9	New Hampshire	75943.25

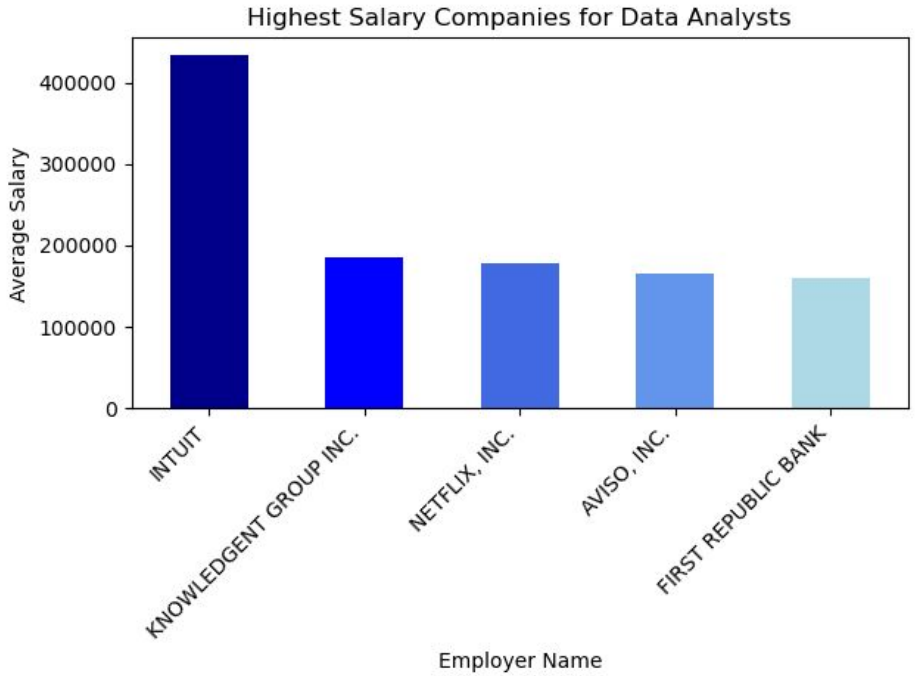
	State	Average Salary
38	Arkansas	62376.48
39	Florida	62016.61
40	South Carolina	61402.00
41	Louisiana	59692.31
42	Oklahoma	55498.40
43	Nebraska	52010.07
44	Idaho	48699.75
45	North Dakota	47714.67
46	Puerto Rico	45000.00
47	Vermont	42000.00

Average Data Salaries of Relevant States



What companies pay their data people most?



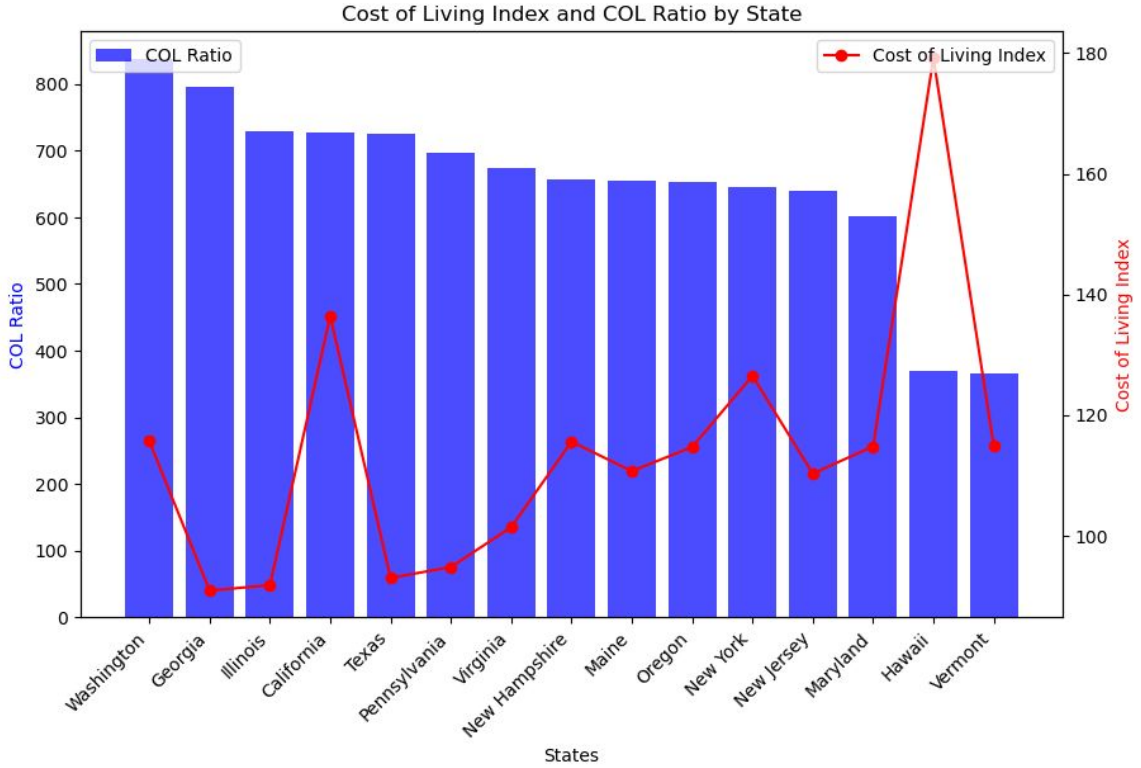


Comparing Costs of Living

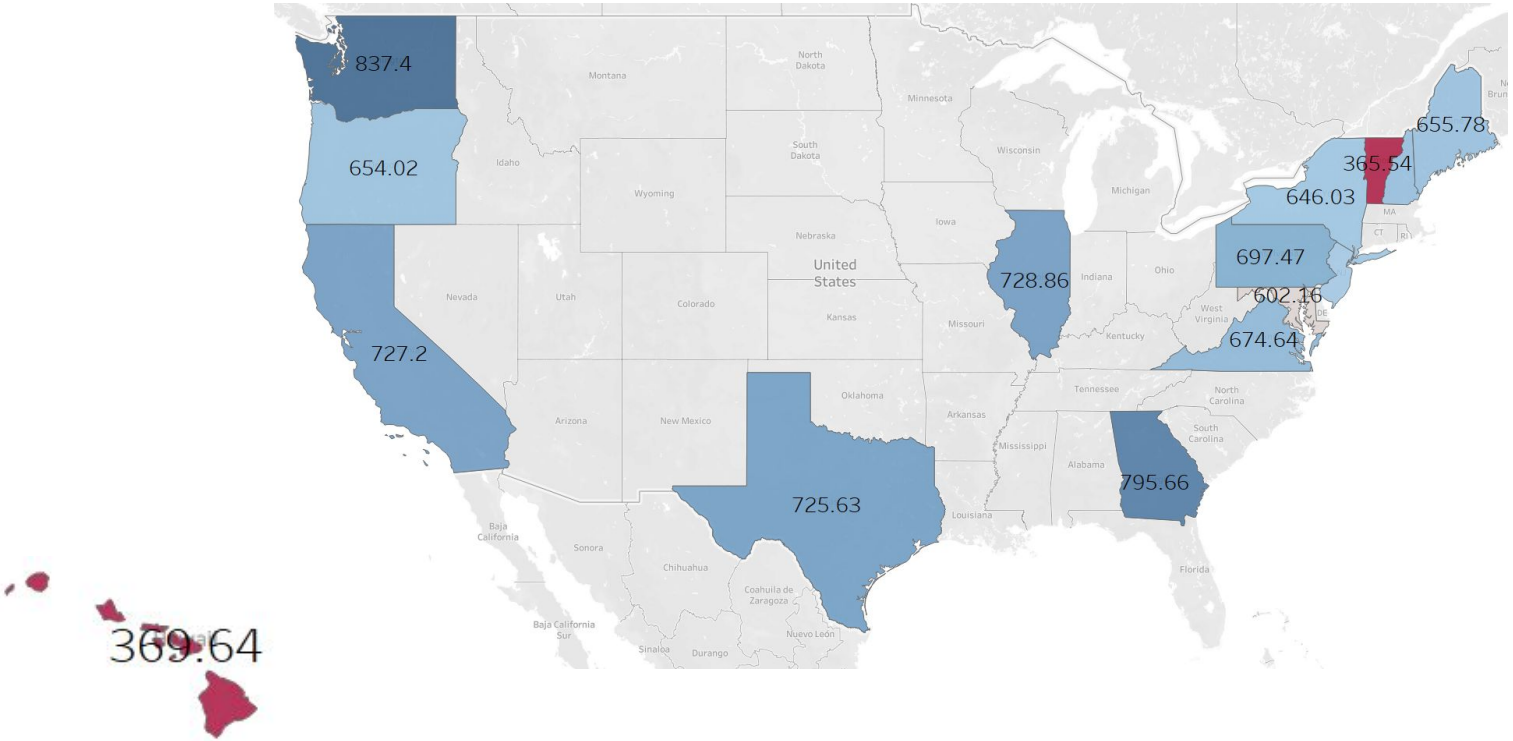
- The COL index is from Missouri Economic Research and Information Center, for Q3 2023
- COL Ratio = Average Salary/COL index
- A higher COL Index means that is more expensive for you to live there
- A higher COL Ratio means that you make more money in a state that is cheaper for you to live in

State	Average Salary	Cost of Living Index	COL Ratio
Washington	96887.08	115.7	837.40
Georgia	72325.67	90.9	795.66
Illinois	66909.28	91.8	728.86
California	99190.31	136.4	727.20
Texas	67483.28	93.0	725.63
Pennsylvania	66120.19	94.8	697.47
Virginia	68407.99	101.4	674.64
New Hampshire	75943.25	115.6	656.95
Maine	72595.25	110.7	655.78
Oregon	75016.47	114.7	654.02
New York	81722.32	126.5	646.03
New Jersey	70514.90	110.3	639.30
Maryland	69127.53	114.8	602.16
Hawaii	66240.33	179.2	369.64
Vermont	42000.00	114.9	365.54
Puerto Rico	45000.00	NaN	NaN

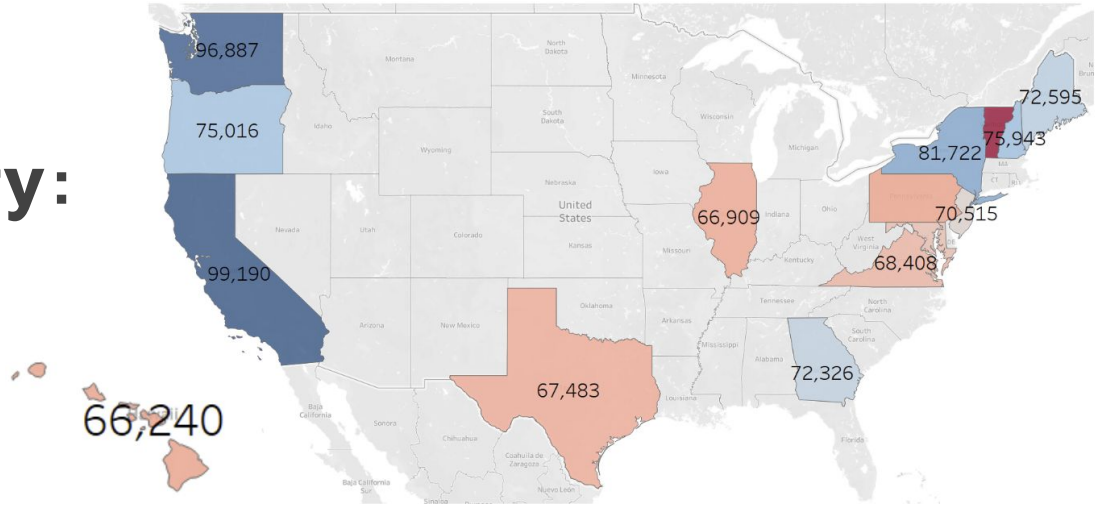
COL Ratio and Index



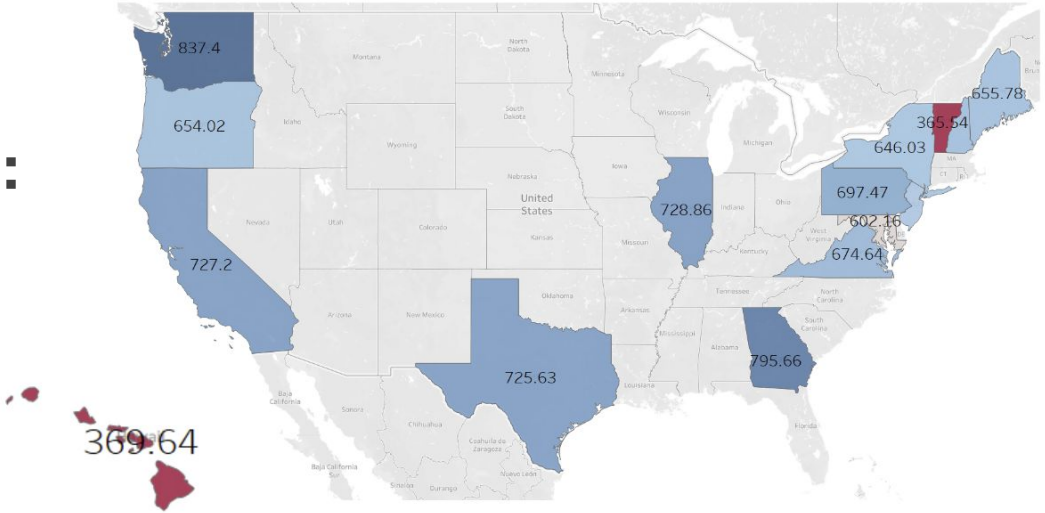
COL Ratio Map



Average Salary:



Cost of Living Ratio:

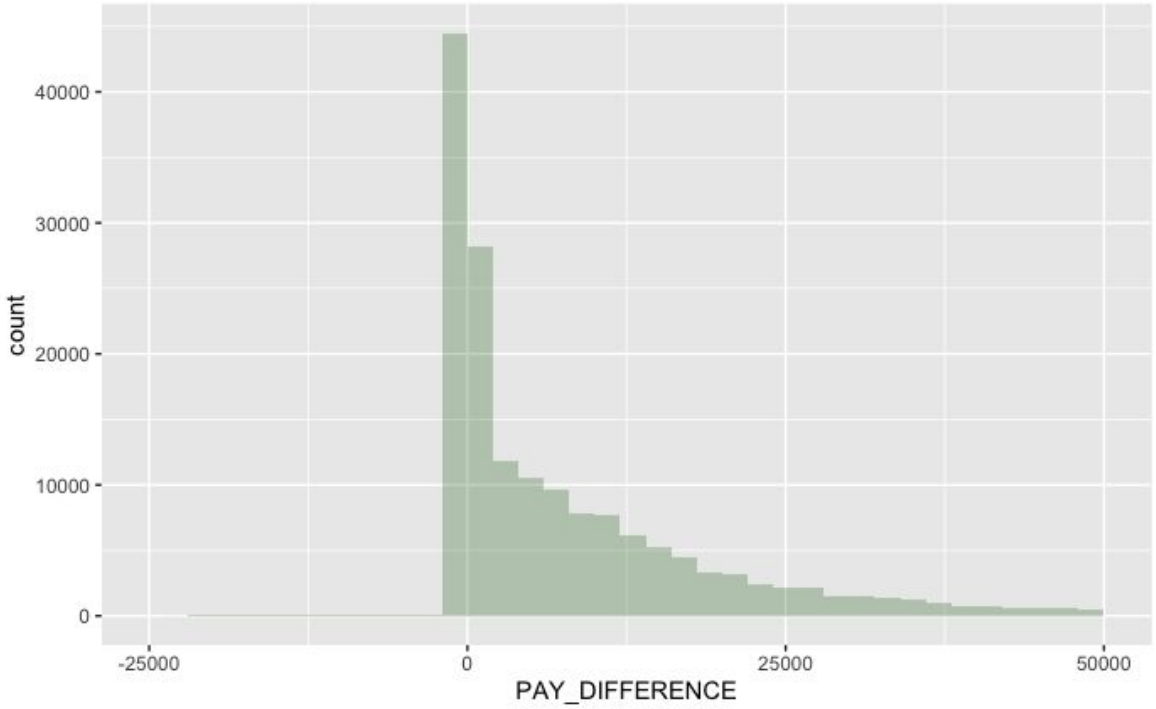


Q3: How do offered salaries compare to the prevailing wage?

Paid Wages minus Prevailing Wages

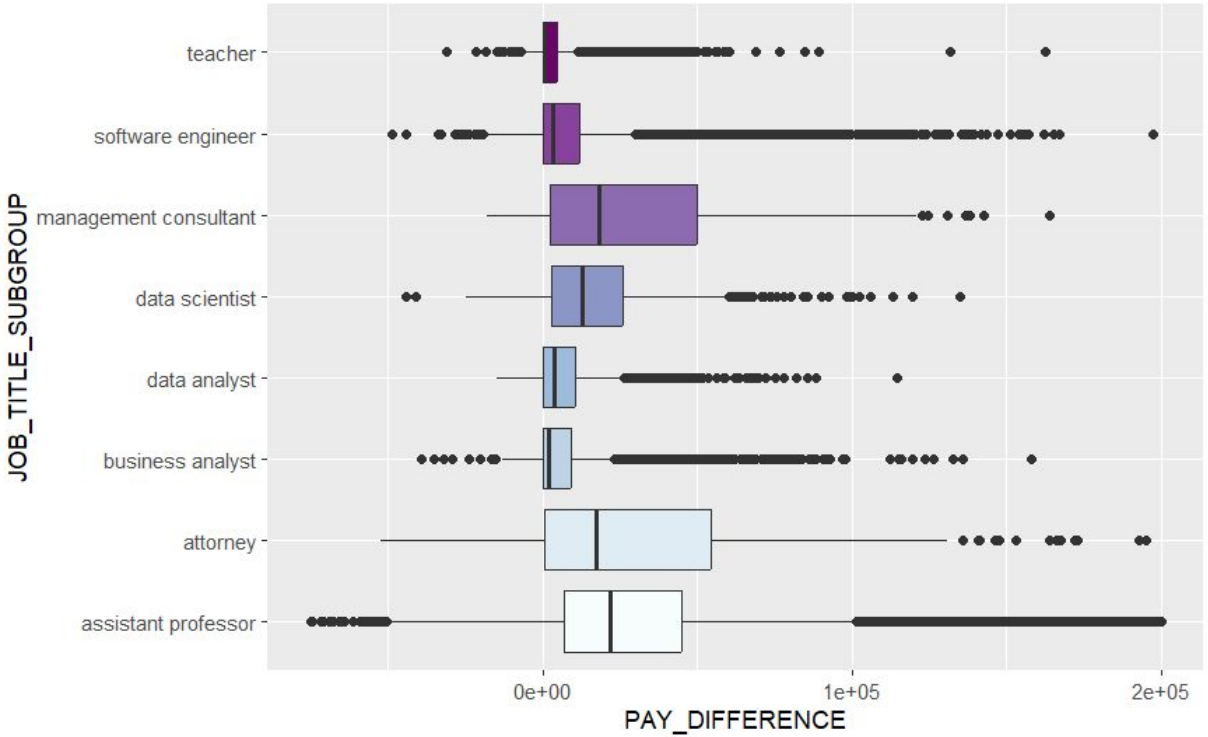
- Offered salaries are mostly close to or higher than prevailing wage (difference > 0)

- ~20% of jobs are underpaid by $0-$2,000 per year (one bin width)

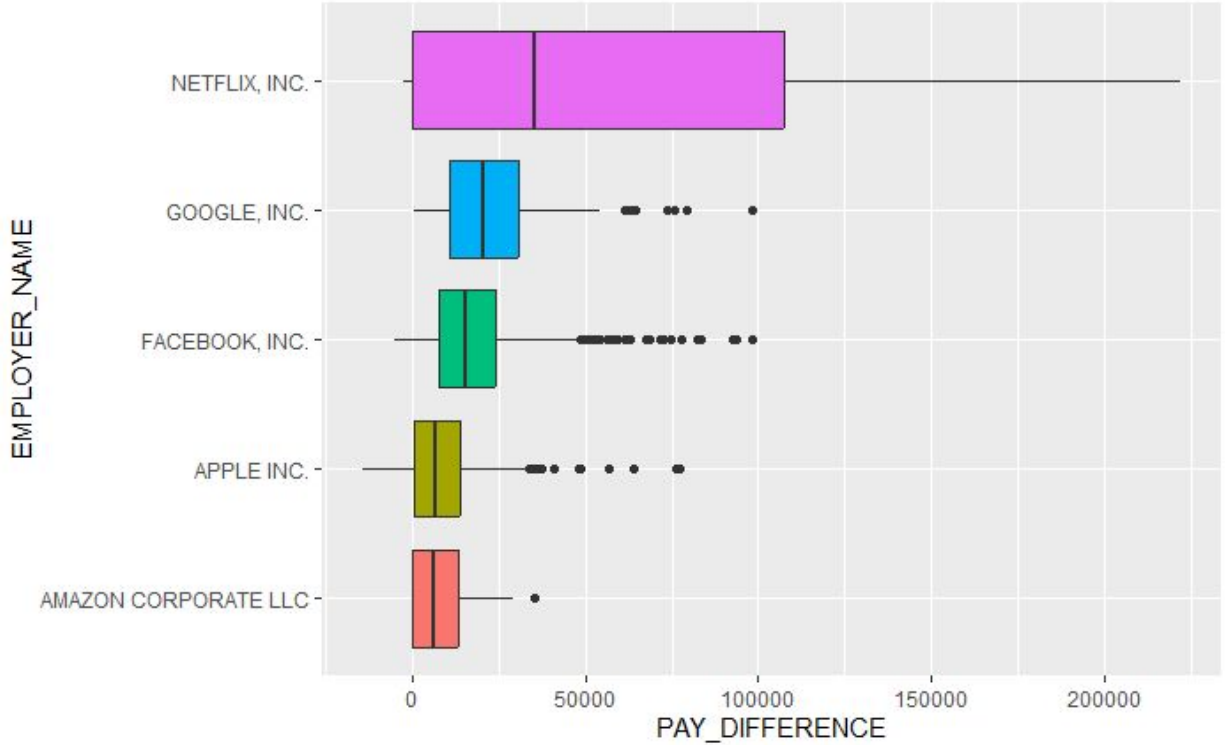


3a. Are there job sub-categories that tend to get overpaid or underpaid?

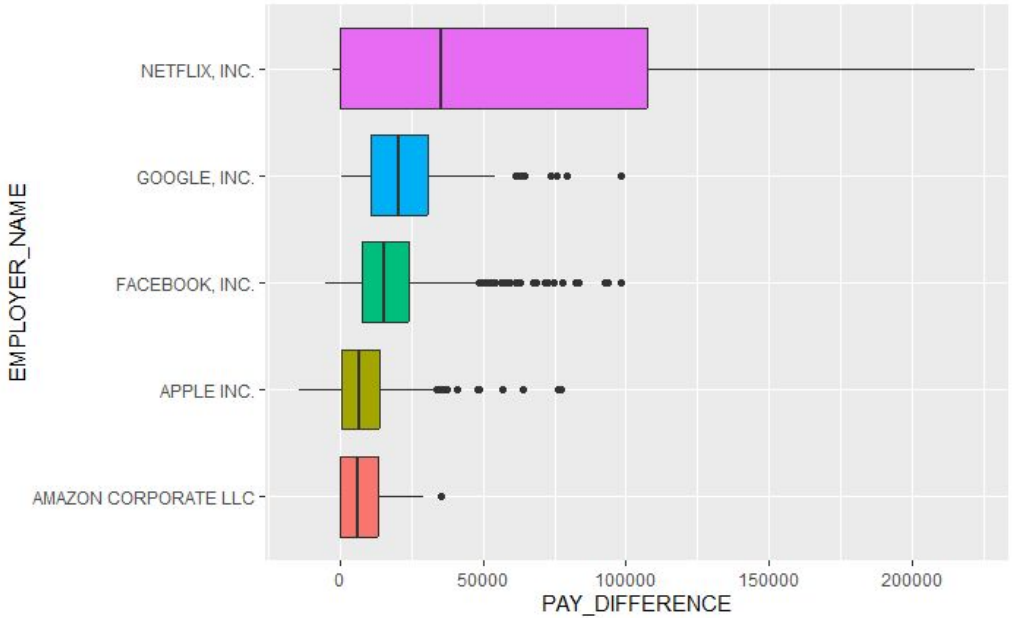
1. ~25% of every job is underpaid (in dataset)
2. Assistant professor, Attorney, and management consultant highest median pay relative to prevailing wage



3b. Are there companies that tend to overpay or underpay?

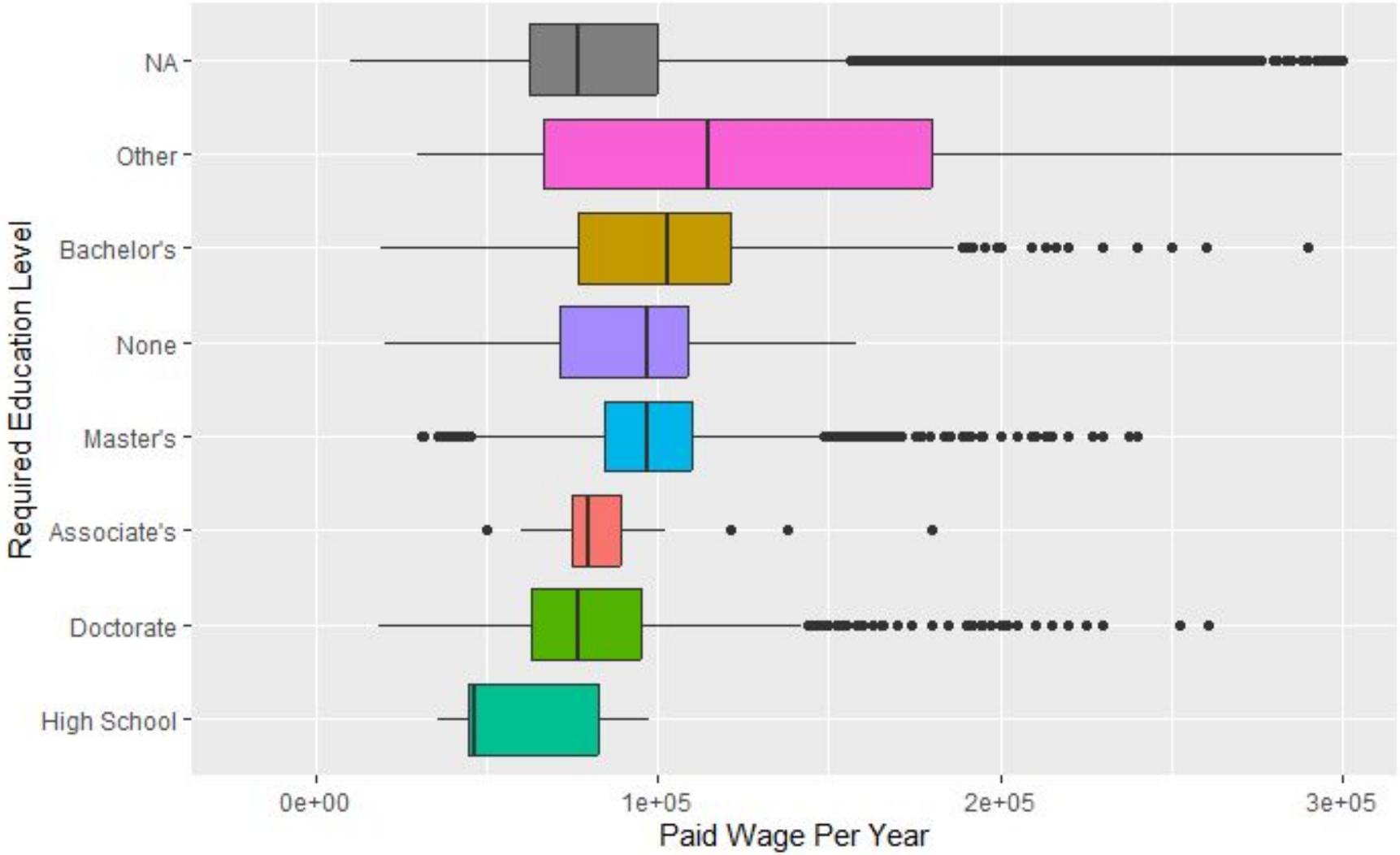


- Amazon is the only company that does not underpay
- Netflix overpays the most
- Apple underpays the most



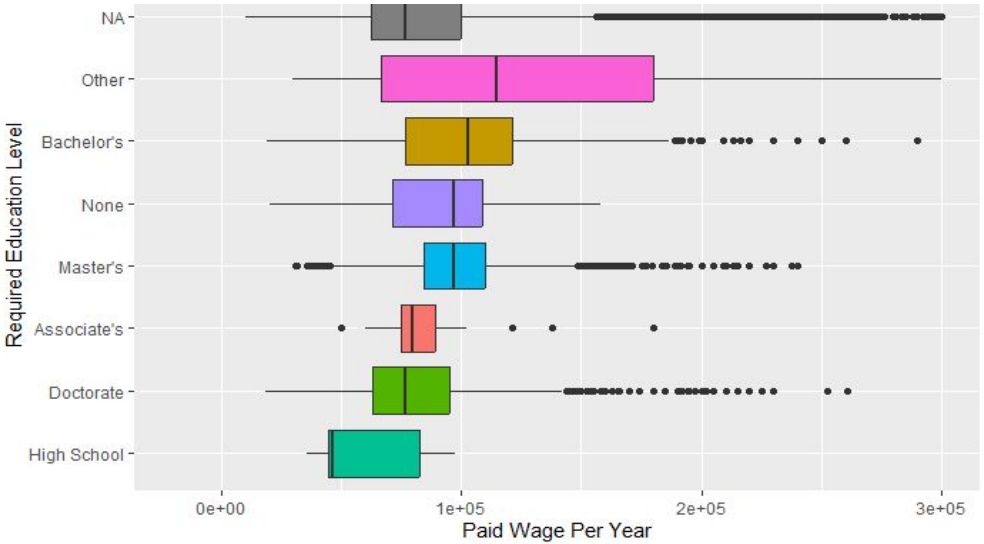
Overpay	Underpay
Netflix	Netflix
Google	Google
Facebook	Facebook
Apple	Apple
Amazon	

Q4
How does wage depend on required level of education?


NA
Other
Bachelor's
None
Master's
Associate's
Doctorate
High School
Required Education Level
0e+00
1e+05
2e+05
3e+05
Paid Wage Per Year

4. How is wage correlated with education required?

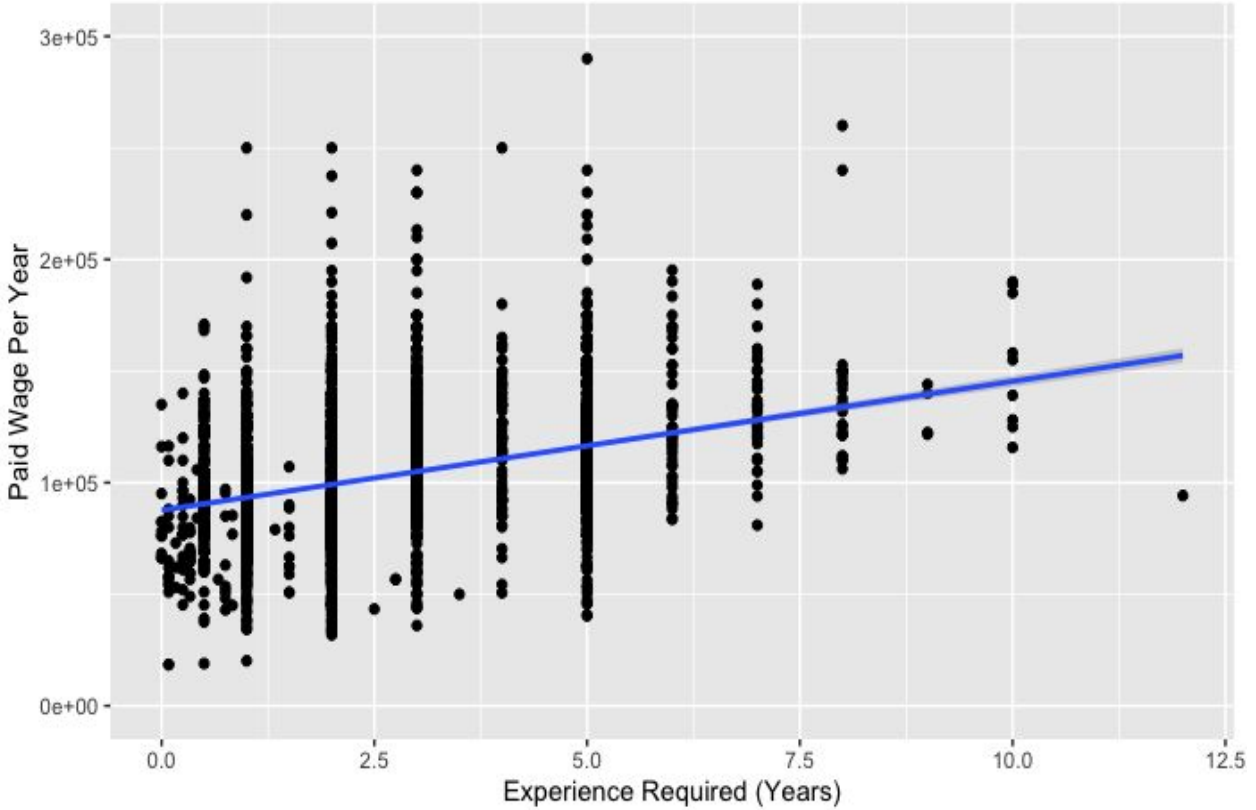
1. High school required jobs pay less
2. Bachelor degree required jobs pay the most
3. No requirement and master's are similar

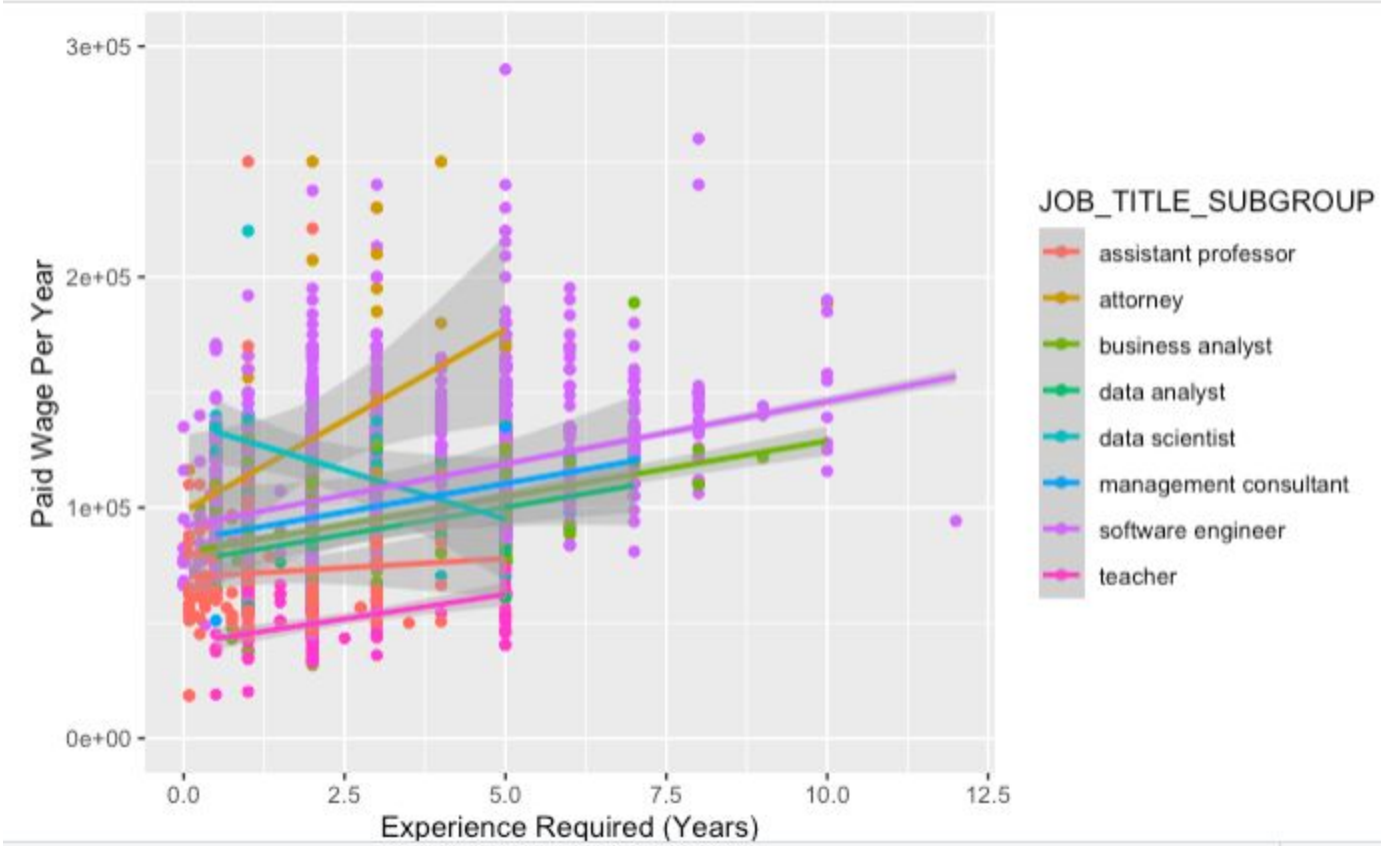


Q5 How is wage correlated with experience required?

5. How is wage correlated with experience required?

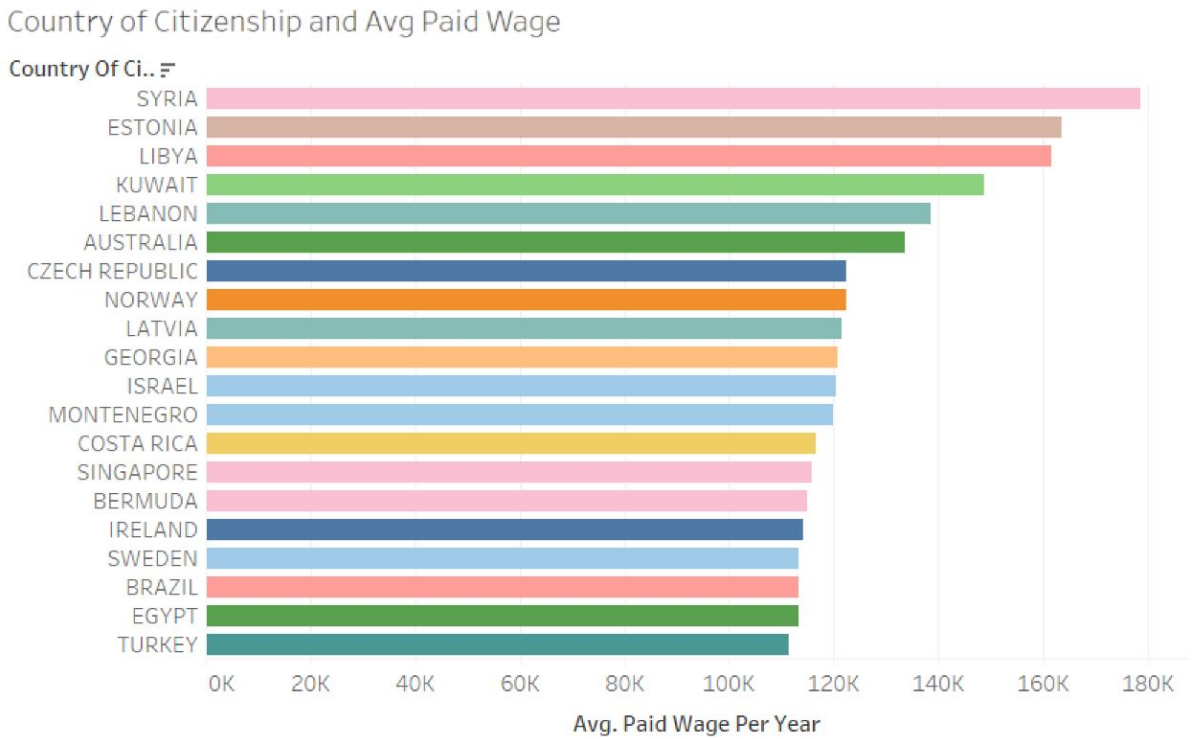
- Weak positive correlation
- Experience required alone is not a good predictor of wages
  - Job subtypes?




3e+05
2e+05
1e+05
0e+00
Paid Wage Per Year
0.0
2.5
5.0
7.5
10.0
12.5
Experience Required (Years)
JOB_TITLE_SUBGROUP
assistant professor
attorney
business analyst
data analyst
data scientist
management consultant
software engineer
teacher

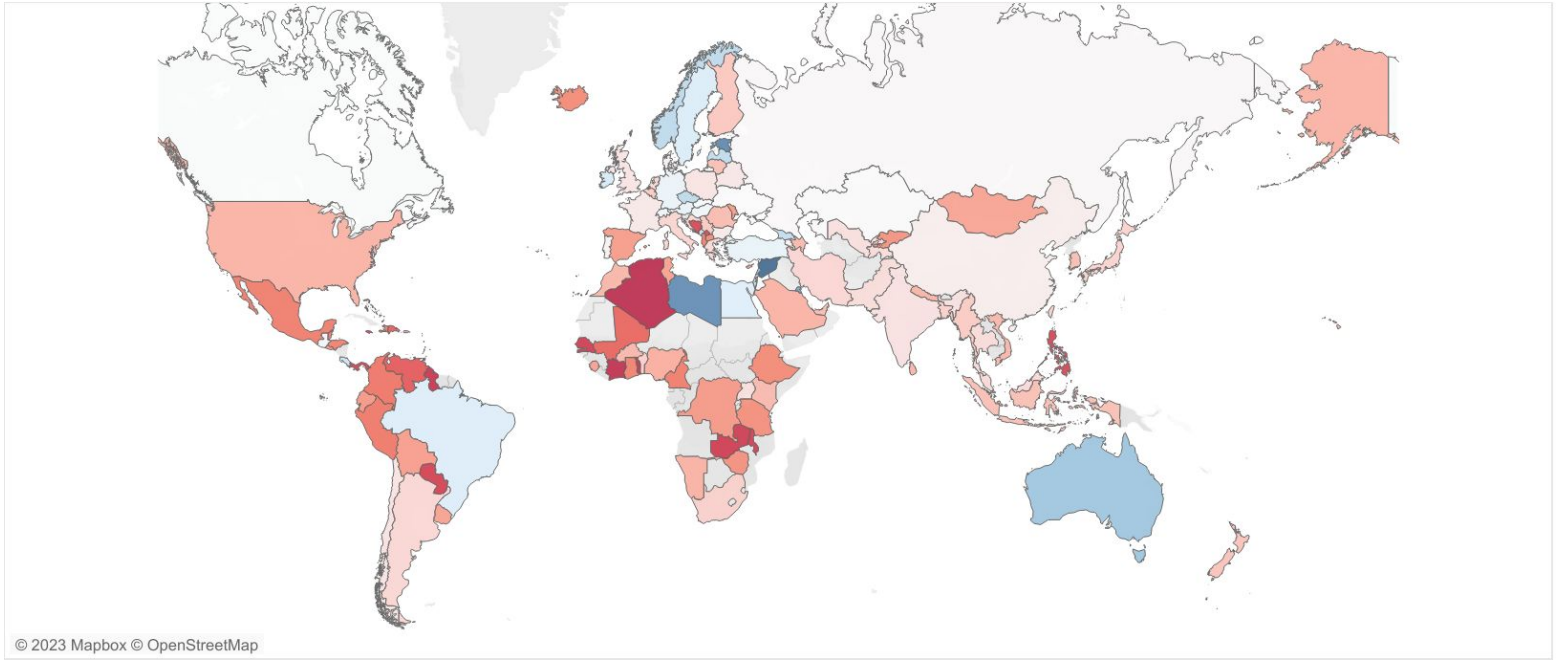
Q6: What is the relationship between the Country of Citizenship and Paid Wage per Year?

What are the countries of citizenship w/ Highest Avg Paid Wage?



Continental display of countries of citizenship based on average paid wage per year

Q6 Map



Conclusions

- Median wage: $78,600; IQR: ($63,000-$100,000)
  - In California: median = $101,000
  - Washington outperforms California when considering cost of living

- Software engineer most prevalent job (63%)

- ~75% of salaries are equal to or above prevailing wages

- Education and experience required are not good predictors of wages by themselves
  - Next steps: group by job type, undersample software engineers?

Github repository

https://github.com/jvincent1113/Team-Anova-Project