Analyzing Visa Applicant Demographics

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##Load Library Packages

```
library(tidyverse)
```

```
## -- Attaching packages ---------------------------------------------------------------------------

## v tibble  3.0.3     v purrr   0.3.4
## v tidyr   1.1.1     v dplyr   1.0.1
## v readr   1.3.1     v forcats 0.5.0

## -- Conflicts ------------------------------------------------------------------------------------
## x lubridate::as.difftime() masks base::as.difftime()
## x lubridate::date()        masks base::date()
## x dplyr::filter()          masks stats::filter()
## x readr::guess_encoding()  masks rvest::guess_encoding()
## x lubridate::intersect()   masks base::intersect()
## x dplyr::lag()             masks stats::lag()
## x purrr::pluck()           masks rvest::pluck()
## x lubridate::setdiff()     masks base::setdiff()
## x lubridate::union()       masks base::union()
```

```
library(readxl)
VisaData <- read_excel("DIIG F20 Data Challenge #2.xlsx")
```

```
## Warning in read_fun(path = enc2native(normalizePath(path)), sheet_i = sheet, :
## Coercing text to numeric in O146963 / R146963C15: '45870'

## Warning in read_fun(path = enc2native(normalizePath(path)), sheet_i = sheet, :
## Coercing text to numeric in O164631 / R164631C15: '76700'
```

In this dataset we have data on 167,278 different visa applications each with 16 different attributes associated with the application.

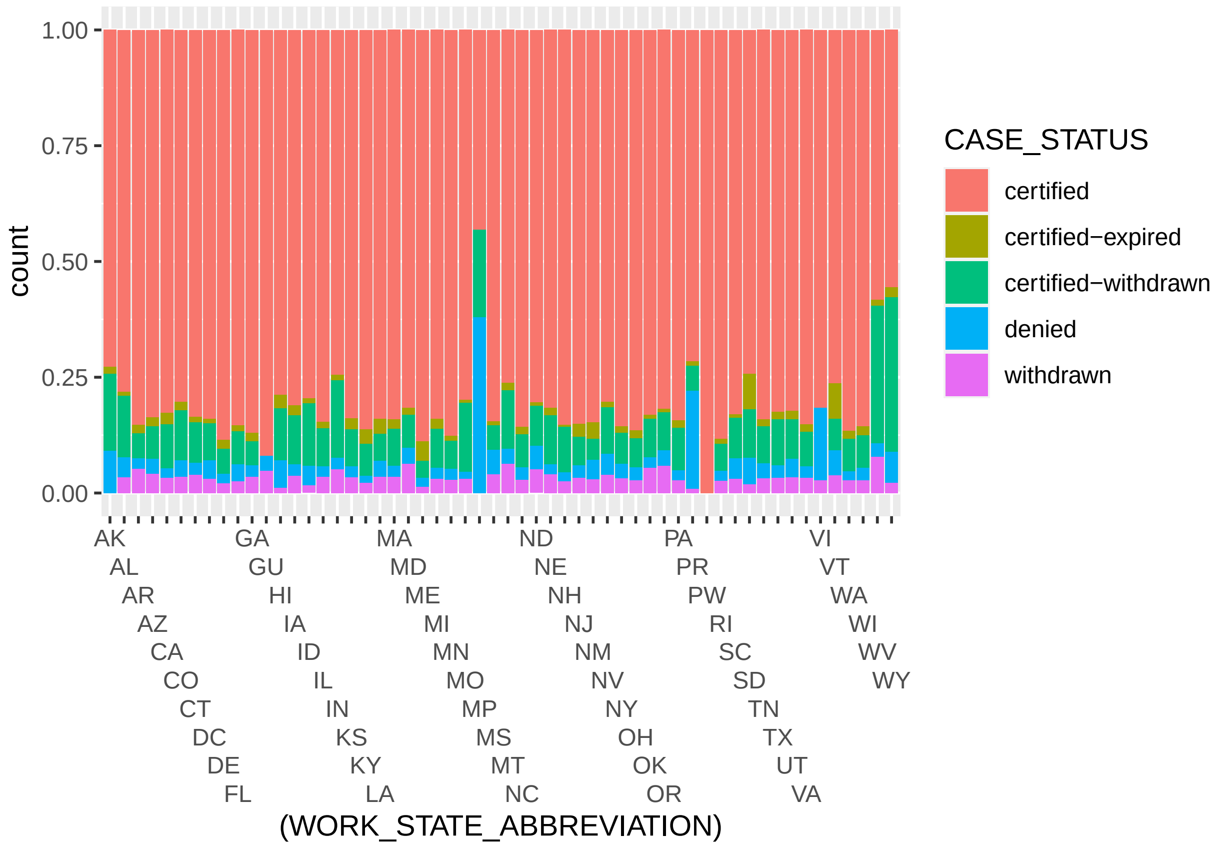
During this analysis I want to answer two major questions:

1. What variables makes an application more likely to get approved and what variables make an application less likely to get approved.
2. How do Job wages compare across locations?

Lets look at question 1 first:

To start off, we should look at where are applicants who get certified apply from, and where applicants who are denied apply from.

```
  ggplot(data = VisaData, mapping =
      aes(x = (WORK_STATE_ABBREVIATION), fill = CASE_STATUS)) +
      geom_bar(position = "fill") + scale_x_discrete(guide=guide_axis(n.dodge=10))
```




```
  labs(y = "proportion")
```

```
## $y
## [1] "proportion"
##
## attr(,"class")
## [1] "labels"
```

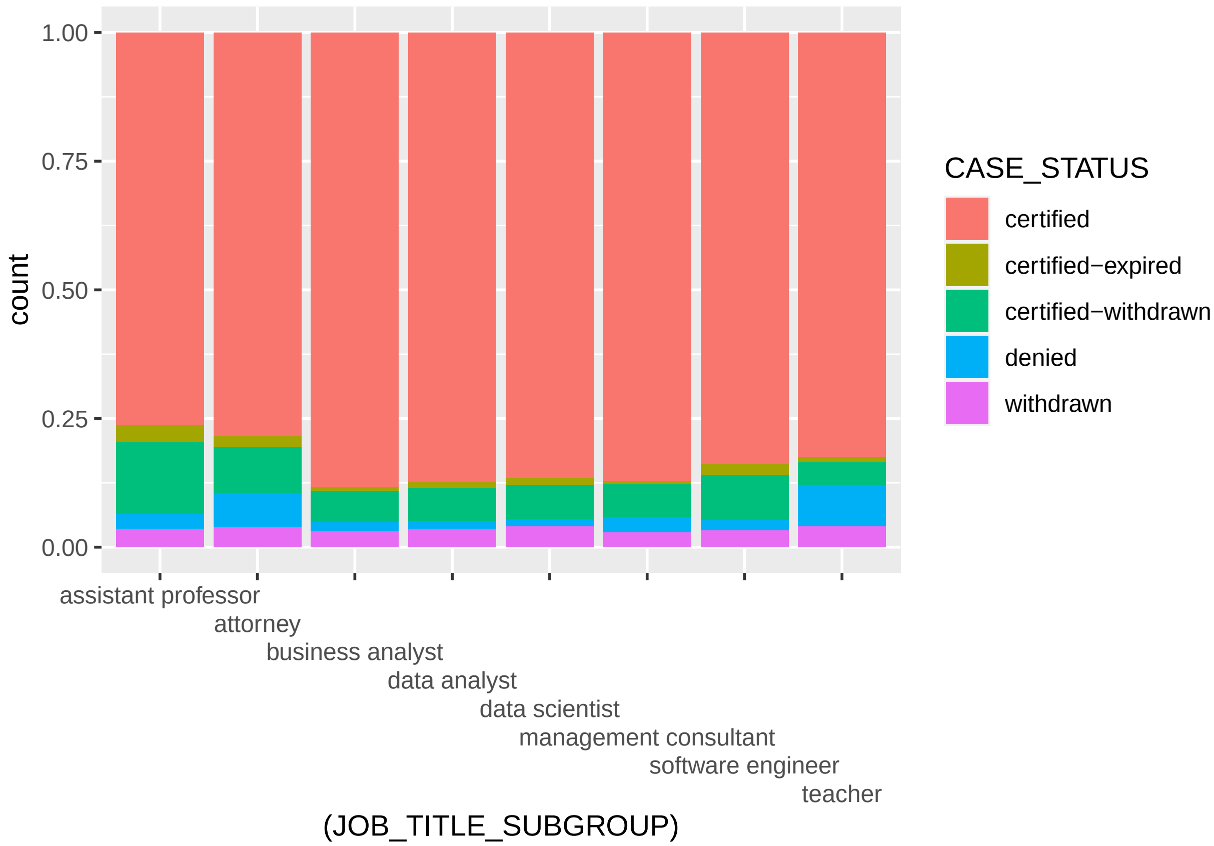
Certification Rate = the percentage of applicants who were Certified by the Visa office.

While most states hover around and 80% Certification rate, it is interesting to note that the US territory of the Northern Marina Islands (MP) has a Certification rate of less than 50%. This is likely due to the fact that MP is a US territory and not a state - inticing Visa offices to approve less applicants from there.

For the most part, for those applying from a US state, there is no significant difference between Visa certifiaciton rate between states.

It might be more beneficial to analyze certification rates based on the job an applicant has. Lets take a look at that now:

```
ggplot(data = VisaData, mapping =
      aes(x = (JOB_TITLE_SUBGROUP), fill = CASE_STATUS)) +
      geom_bar(position = "fill") + scale_x_discrete(guide=guide_axis(n.dodge=10))
```



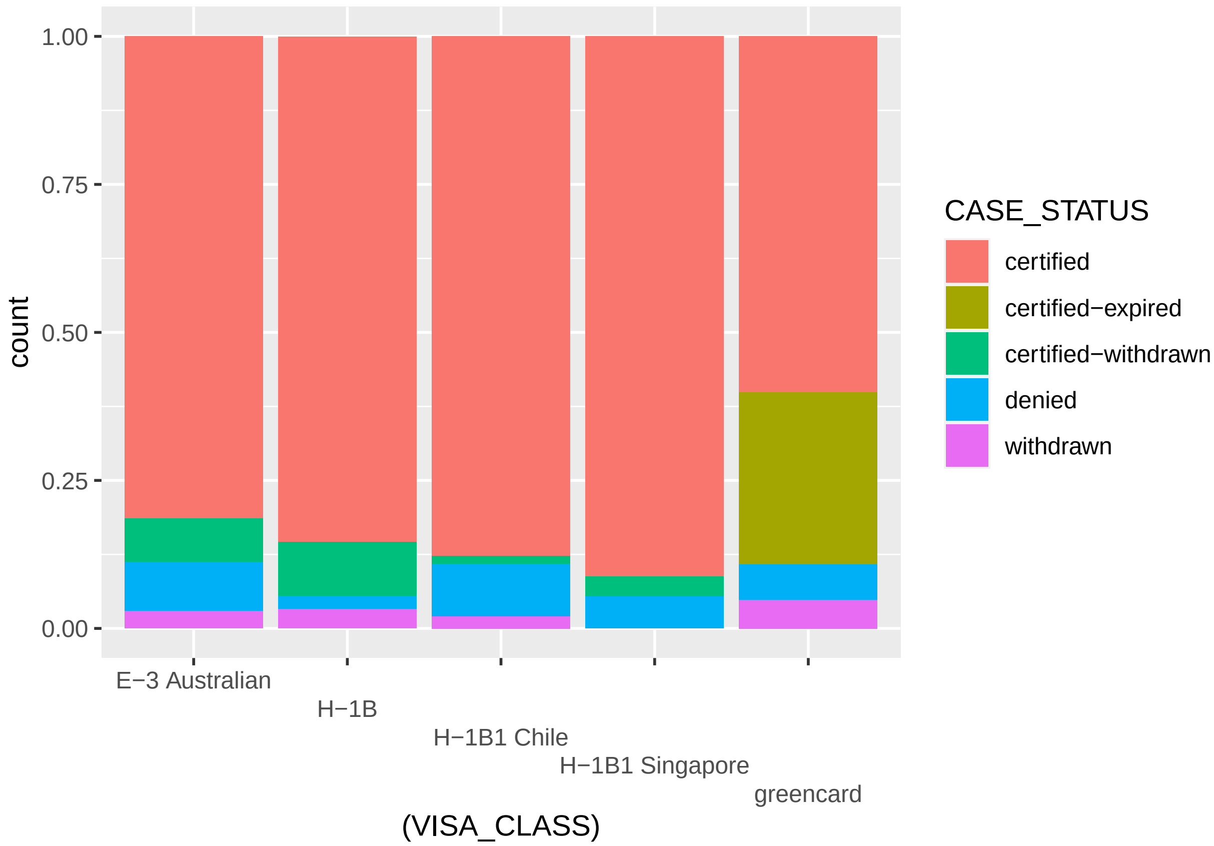

```
  labs(y = "proportion")
```

```
## $y
## [1] "proportion"
##
## attr(,"class")
## [1] "labels"
```

Based on the data, there doesn't appear to be a signifcant difference regarding the occupation an applicant holds and their probability of being approved. All the jobs here seem to fluctuate between a 75% - 92% Certificaiton rate. It is worth noting that almost every job had a certificaiton rate of about 92% except for Asistant professors and attorney's - those were closer to the 75% Certification rate.

Finally, we can take a look at how the Visa Class applied for influences the certification rate for an applicant.

```
ggplot(data = VisaData, mapping =
      aes(x = (VISA_CLASS), fill = CASE_STATUS)) +
      geom_bar(position = "fill") + scale_x_discrete(guide=guide_axis(n.dodge=10))
```




```
  labs(y = "proportion")
```

```
## $y
## [1] "proportion"
##
## attr(,"class")
## [1] "labels"
```

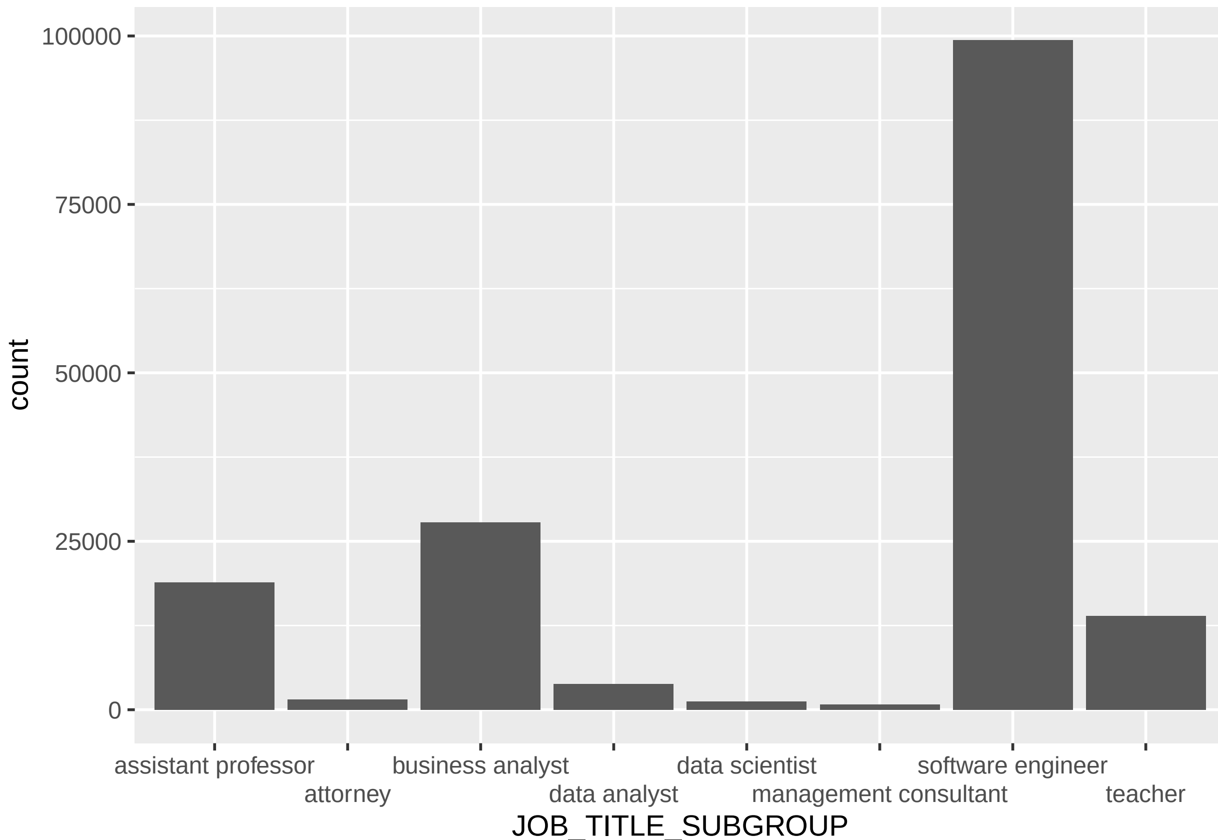
Here we can clearly see that applicants who applied for a Greencard were certified at a rate of about 60% - much lower than the other Visa Classes. Furthermore H-1B1 applicants from Singapore were approved at the highest Certification Rate - almost 90%.

In summary:

Now lets look at how we can answer question 2:

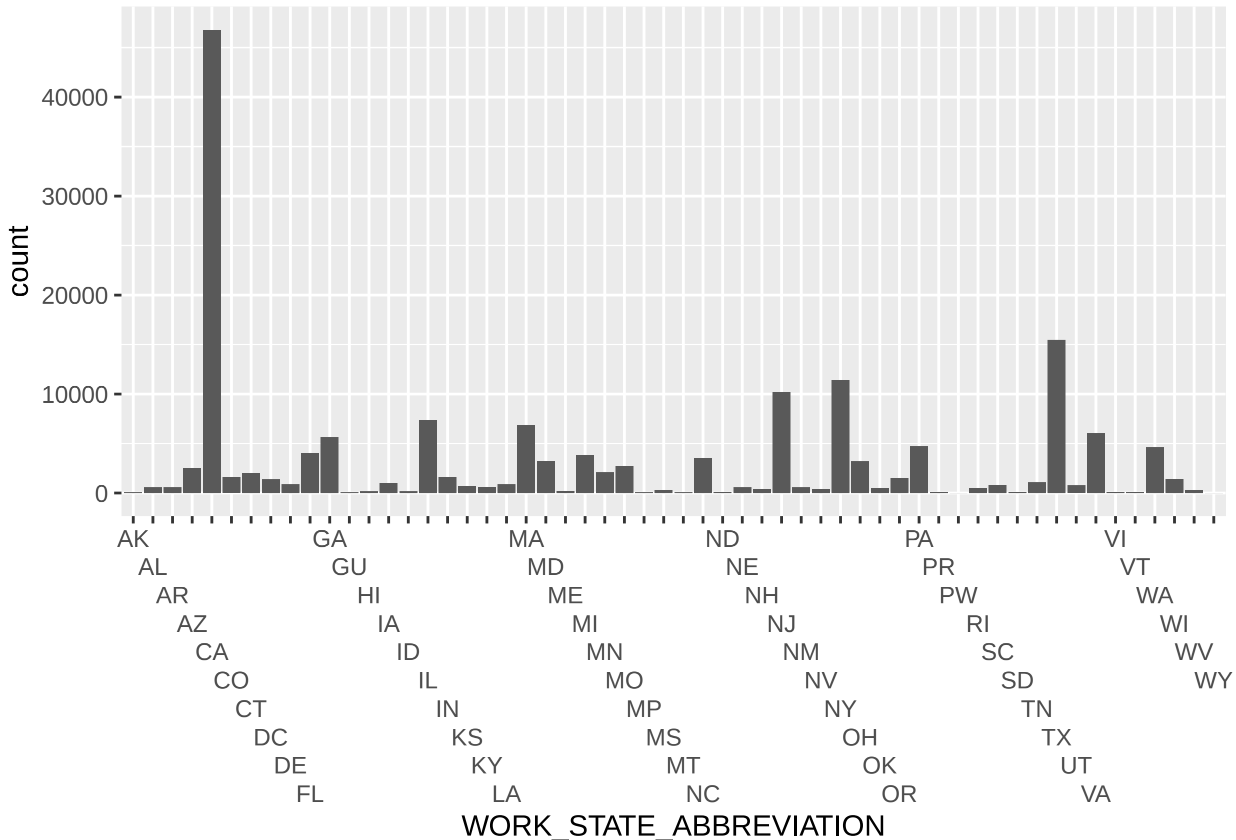
To analyze wages lets first construct a plot of all the different jobs in the dataset

```
ggplot(data = VisaData, mapping = aes(x = JOB_TITLE_SUBGROUP)) + scale_x_discrete(guide=guide_axis(n.do
  geom_bar()
```



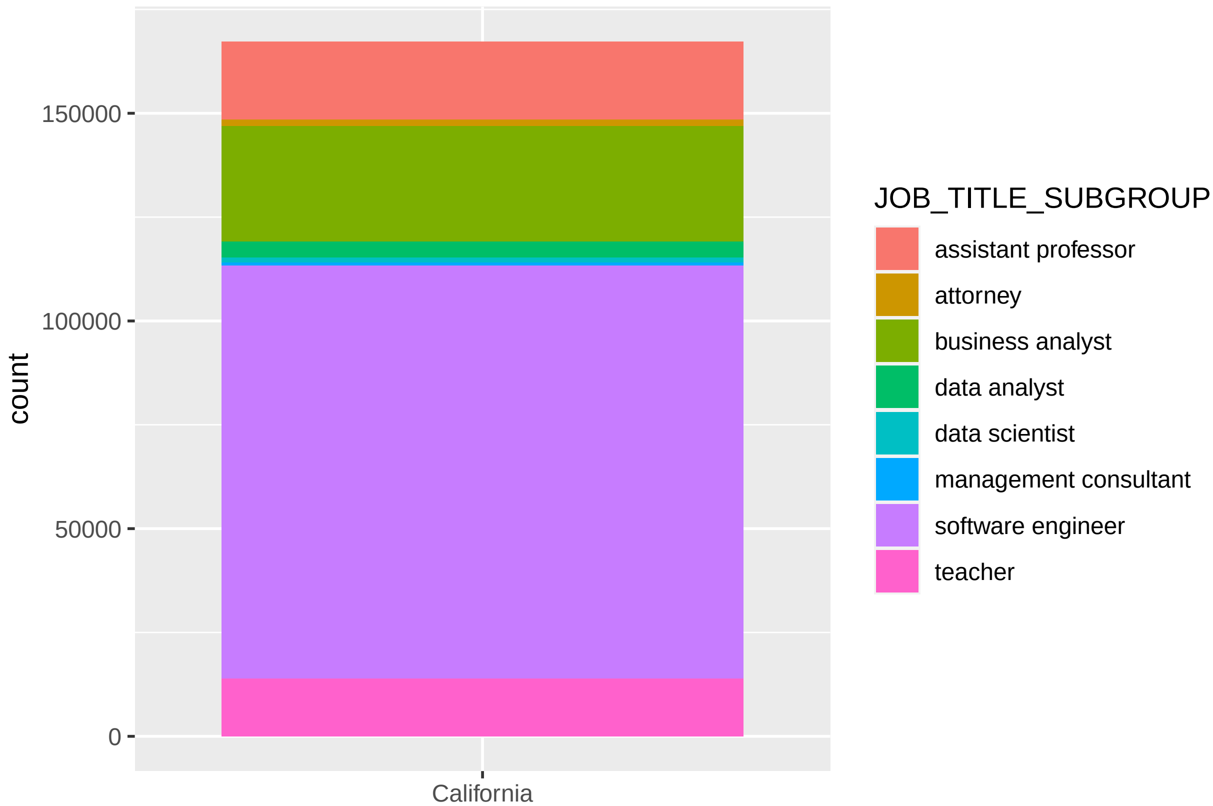
Now lets look at the locations where these visa applicants live:

```
ggplot(data = VisaData, mapping = aes(x = WORK_STATE_ABBREVIATION)) + scale_x_discrete(guide=guide_axis
  geom_bar()
```



It's clear to see that the overwhelming majority of Visa-Applicants in this dataset are residing in California. This is important to note as California is a hub for software development jobs. Lets take a look at how many people who applied for a Visa in California also have a software related job.

```
ggplot(data = VisaData, mapping = aes(x = (WORK_STATE = "California"), fill = JOB_TITLE_SUBGROUP)) + sca
  geom_bar()
```



(WORK_STATE = "California")

An overwhelming majority of the applicants from California are working some sort of software job. This is important to note as these software related jobs typically pay much more than say a teacher.

To further analyze this we should look at average wages in each state:

```
WageMean <- aggregate( PAID_WAGE_PER_YEAR ~ WORK_STATE, VisaData, mean )
WageMean <- WageMean[order(WageMean$PAID_WAGE_PER_YEAR,decreasing=T),]
WageMean
```

```
##                WORK_STATE PAID_WAGE_PER_YEAR
## 55          West Virginia          109426.87
## 5              California          103571.11
## 54             Washington          102176.68
## 35               New York           91601.76
## 4                Arkansas           90270.75
## 1                 Alabama           87326.28
## 24          Massachusetts           86610.73
## 43           Pennsylvania           83889.44
## 9    District of Columbia           81968.36
## 27            Mississippi           81950.75
## 41                 Oregon           81530.55
## 19                 Kansas           81031.78
## 20               Kentucky           80146.98
## 7             Connecticut           79578.57
## 23               Maryland           79153.98
## 31                 Nevada           79152.48
## 17                Indiana           78722.99
## 18                   Iowa           78219.47
```

```
## 56                Wisconsin           77728.96
## 32            New Hampshire           77434.66
## 50                     Utah           77240.40
## 16                 Illinois           77113.75
## 33               New Jersey           76371.10
## 28                 Missouri           75495.05
## 26                Minnesota           75386.05
## 6                  Colorado           75155.24
## 53                 Virginia           74920.77
## 2                    Alaska           74792.22
## 39                     Ohio           74777.45
## 36           North Carolina           74667.46
## 45             Rhode Island           74113.52
## 25                 Michigan           73812.99
## 49                    Texas           72765.87
## 30                 Nebraska           72600.09
## 51                  Vermont           72542.18
## 10                  Florida           72338.71
## 11                  Georgia           72287.96
## 8                  Delaware           71830.13
## 14                   Hawaii           71223.47
## 22                    Maine           71180.42
## 3                   Arizona           70963.94
## 48                Tennessee           70046.77
## 40                 Oklahoma           68444.30
## 15                    Idaho           68073.61
## 37             North Dakota           67486.34
## 21                Louisiana           67124.28
## 57                  Wyoming           66189.39
## 29                  Montana           65990.60
## 47             South Dakota           61421.45
## 46           South Carolina           61375.78
## 42                    Palau           60000.00
## 34               New Mexico           56641.53
## 44              Puerto Rico           53040.66
## 13                   Guamam           48557.00
## 52           Virgin Islands           41972.36
## 12                     Guam           39784.83
## 38 Northern Mariana Islands           18932.39
```