

YouAreHired presents

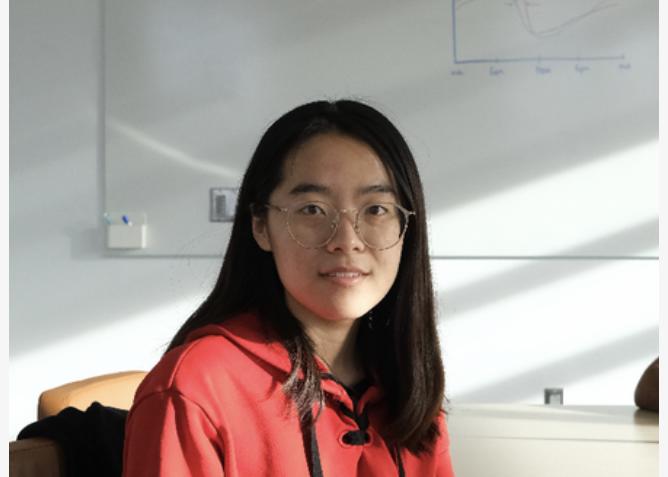
Analysis of Engineer-related Employment Trend in United States



Engineers at work



The Team 8



Lanyu Dong

CEO



Tong Zhou

CTO



Hung-wei Chung

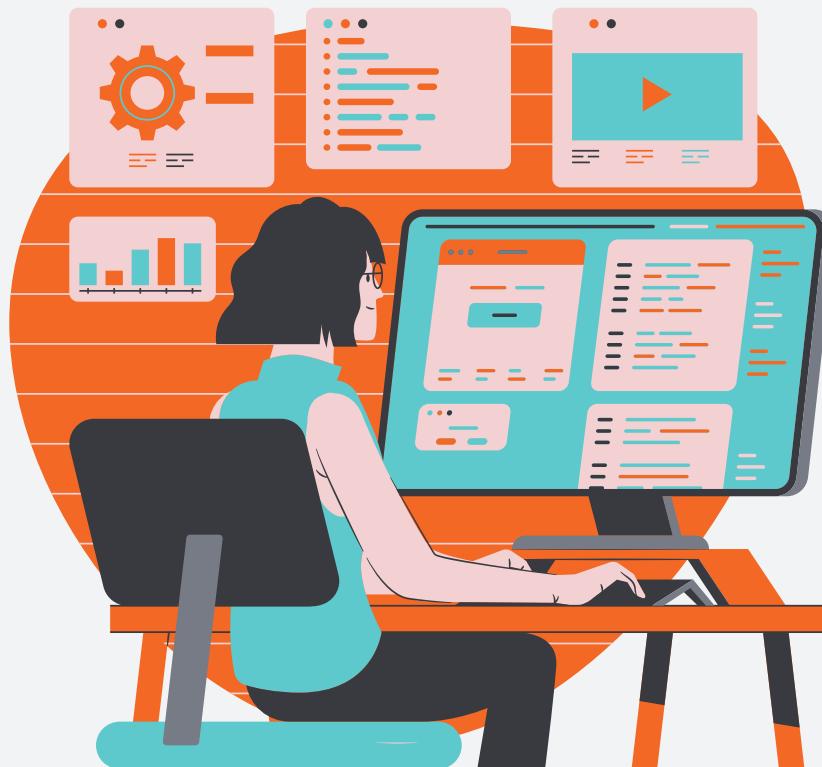
CFO



Chuting Li

CPO

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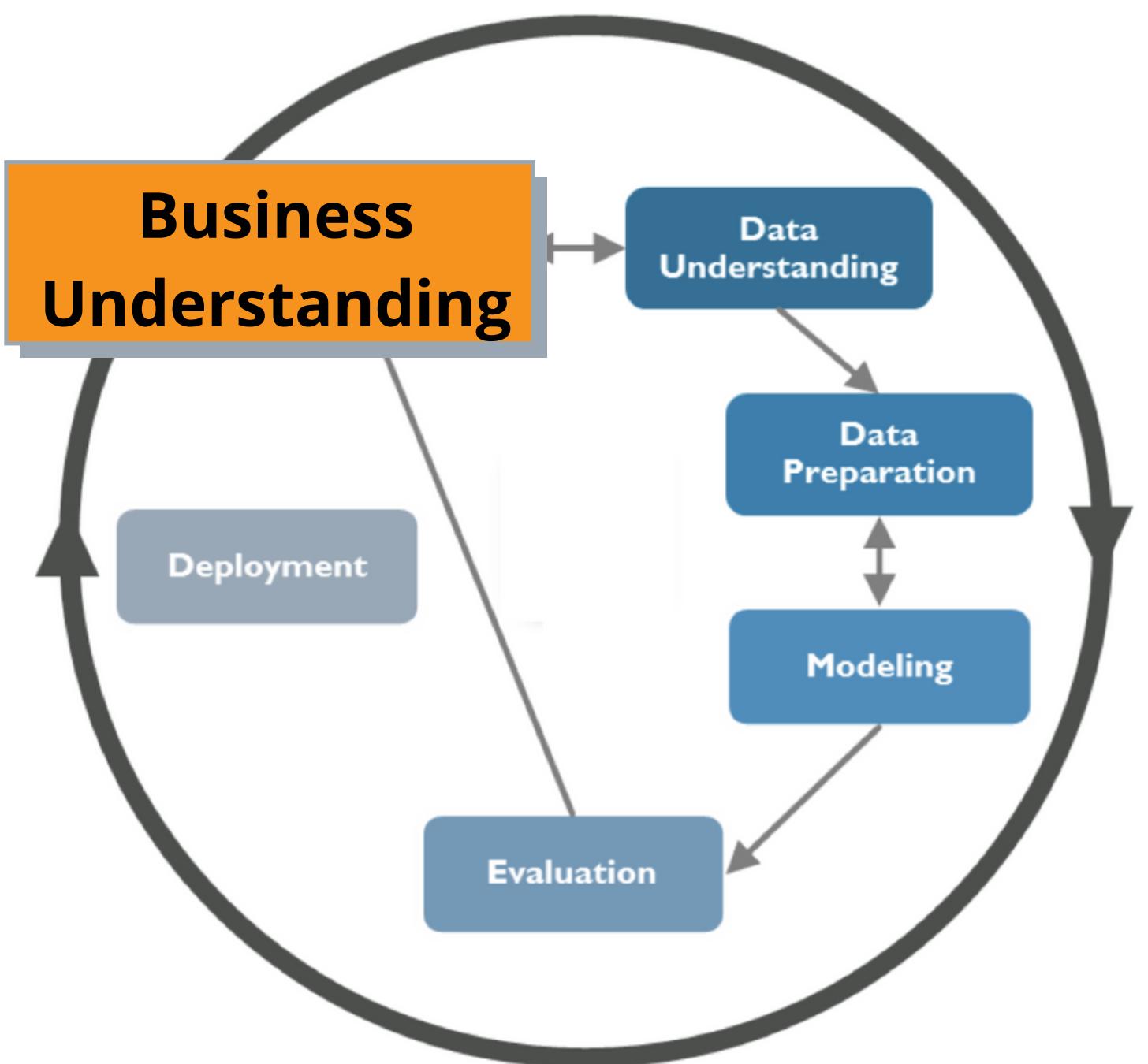
Part 1

Business Understanding

- Introduction to our business idea
- Target user



We provide engineers with in-depth analysis of occupation data and advice on personalized career trends



Business Understanding

Target users: Engineers and technical professionals at any stage of their career who want to learn the trend of the target occupation

Present solution: The Engineer's Coach, is offering a one-on-one career counseling service to engineers, which charges more than \$75 per hour

Defining success: Customer satisfaction

USP: Personalized and in-depth analysis



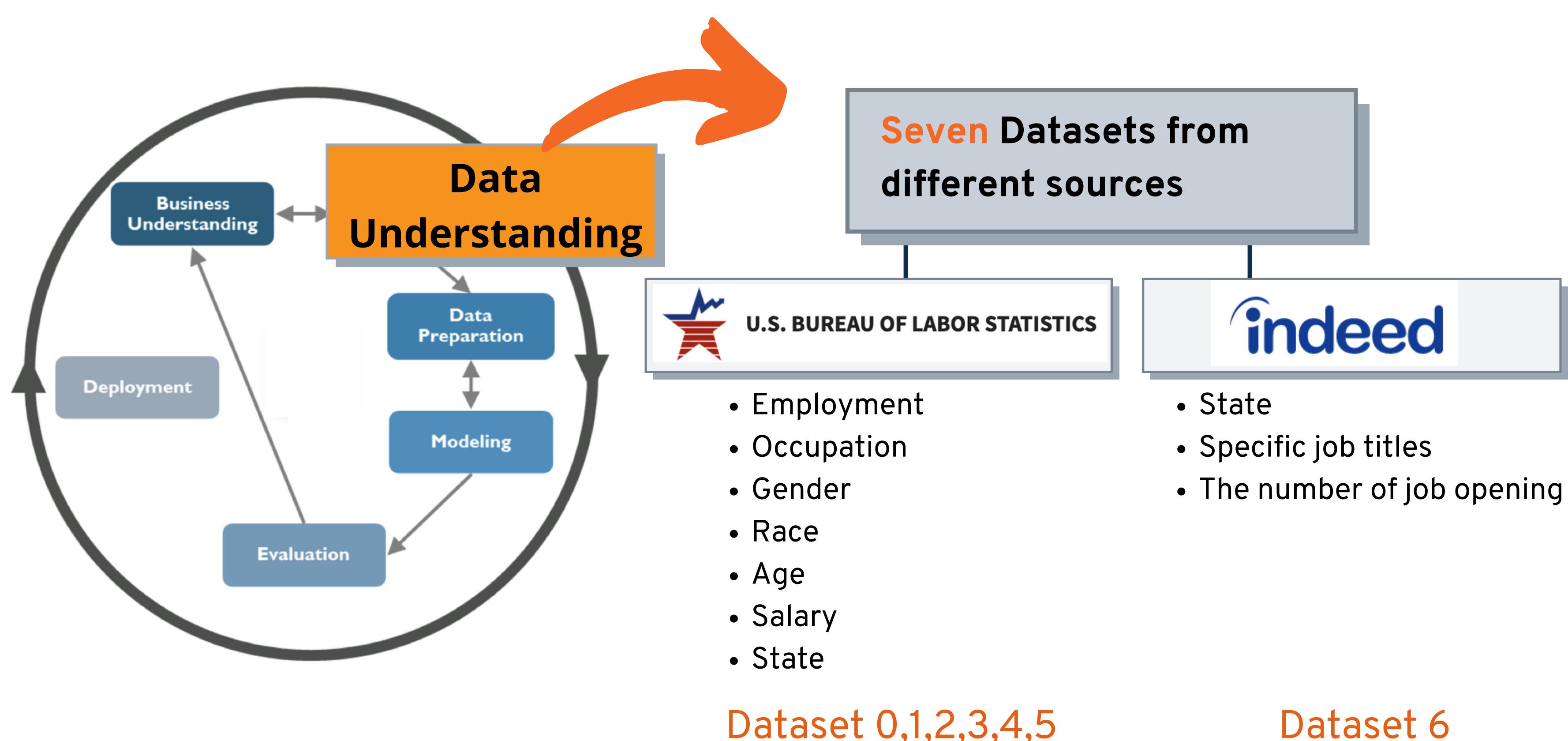
Part 2

Data Understanding

- Data source
- Handle missing data



Data are collected from BLS and scraped from Indeed



We select, clean, construct, and merge the datasets

Data Preparation

Fill the missing data using different patterns

Dataset 0

Drop rows with 'NaN'

Dataset 1

'*' indicates that a wage estimate is not available

- We delete rows

'#' indicates a wage equal to or greater than \$100.00 per hour or \$208,000 per year

- Substitute values with 100.00/208,000 in corresponding columns

Dataset 2

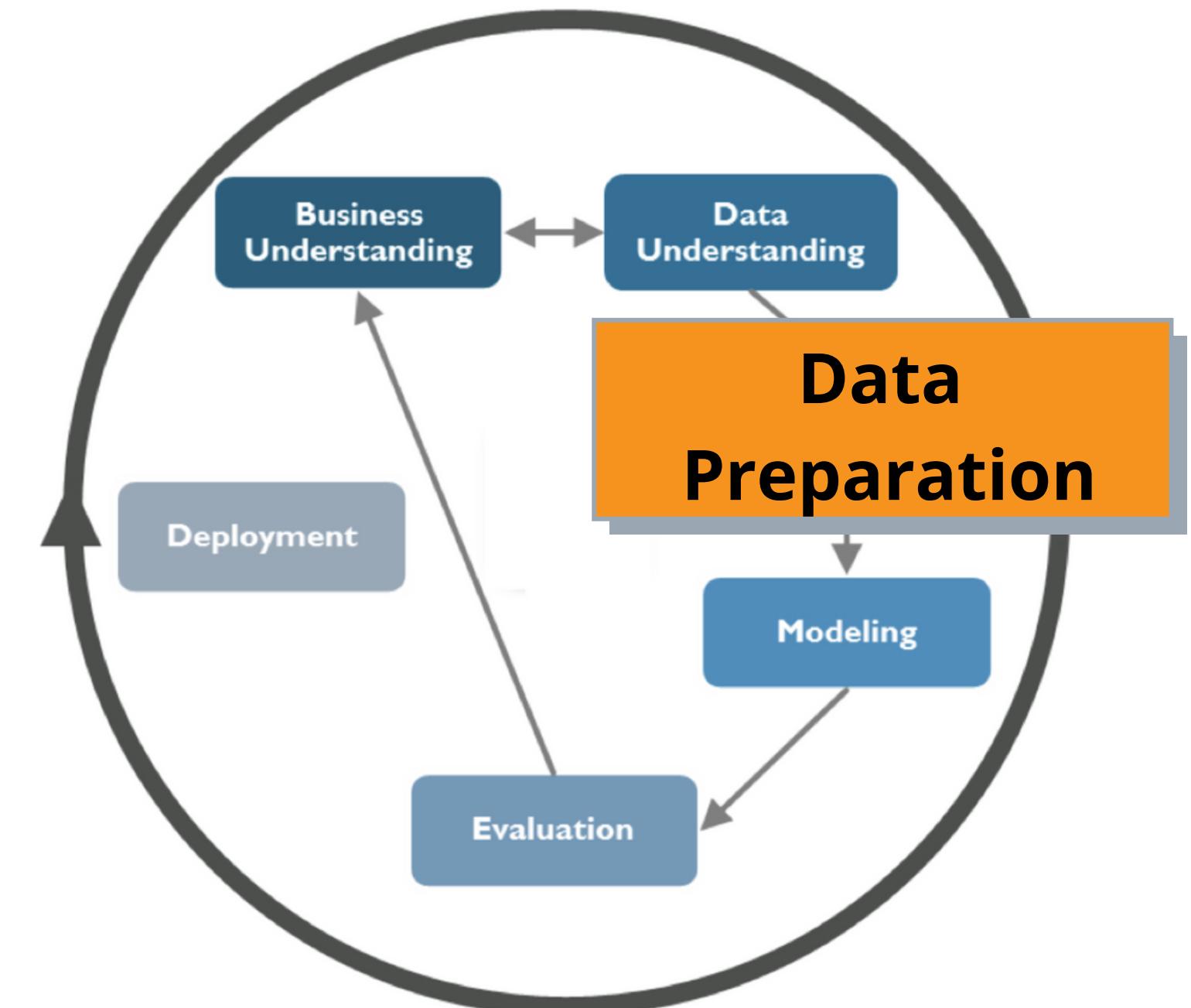
We fill the NaN in median age column

Dataset 3 & Dataset 4

We substitute '-' rows with 'NaN'

Merge datasets to get useful information

Dataset 1 & 5



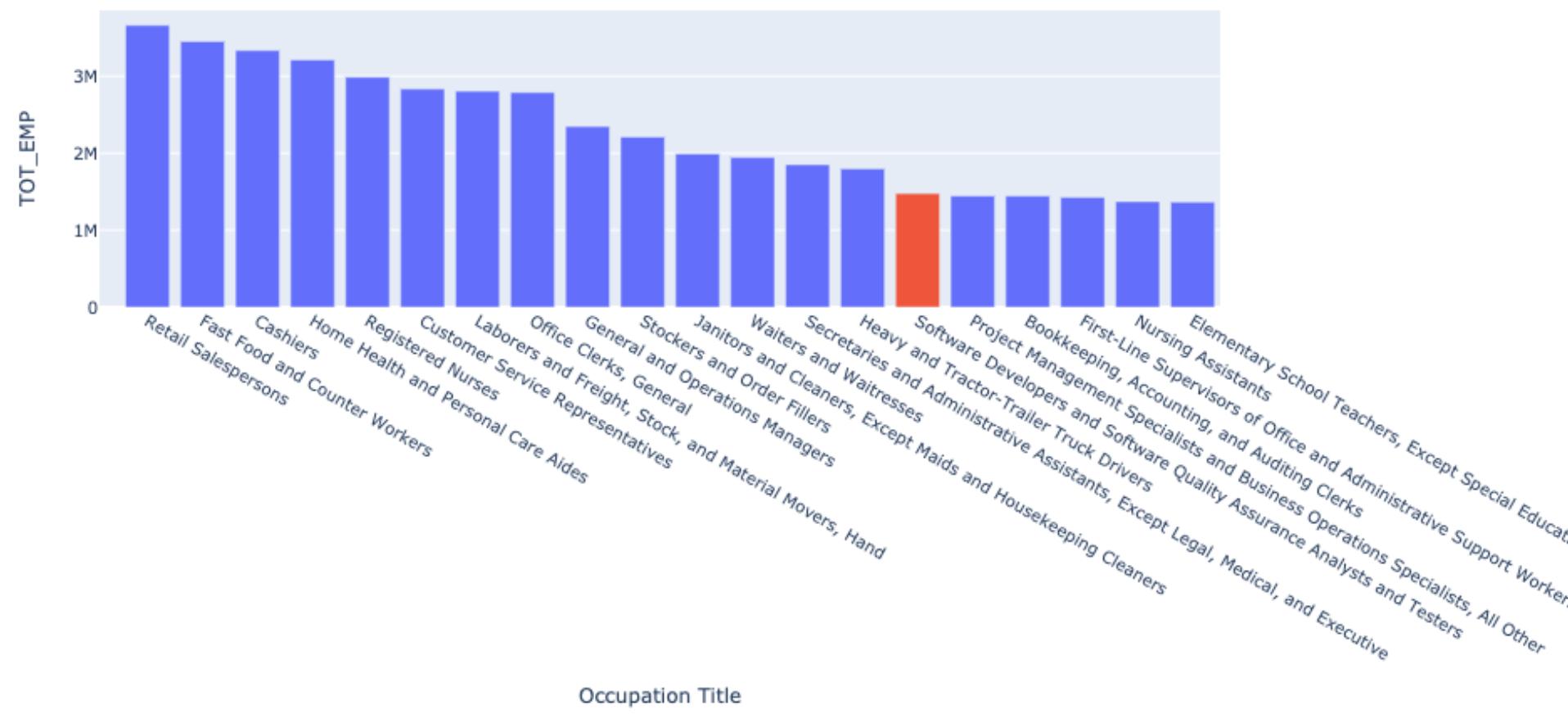
Part 3

Data Analysis and Insights



Employment - U.S.

Top 20 jobs with highest Total employment number of All Occupations

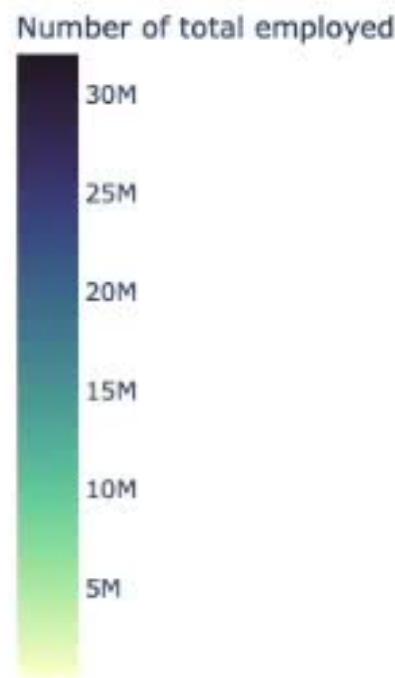
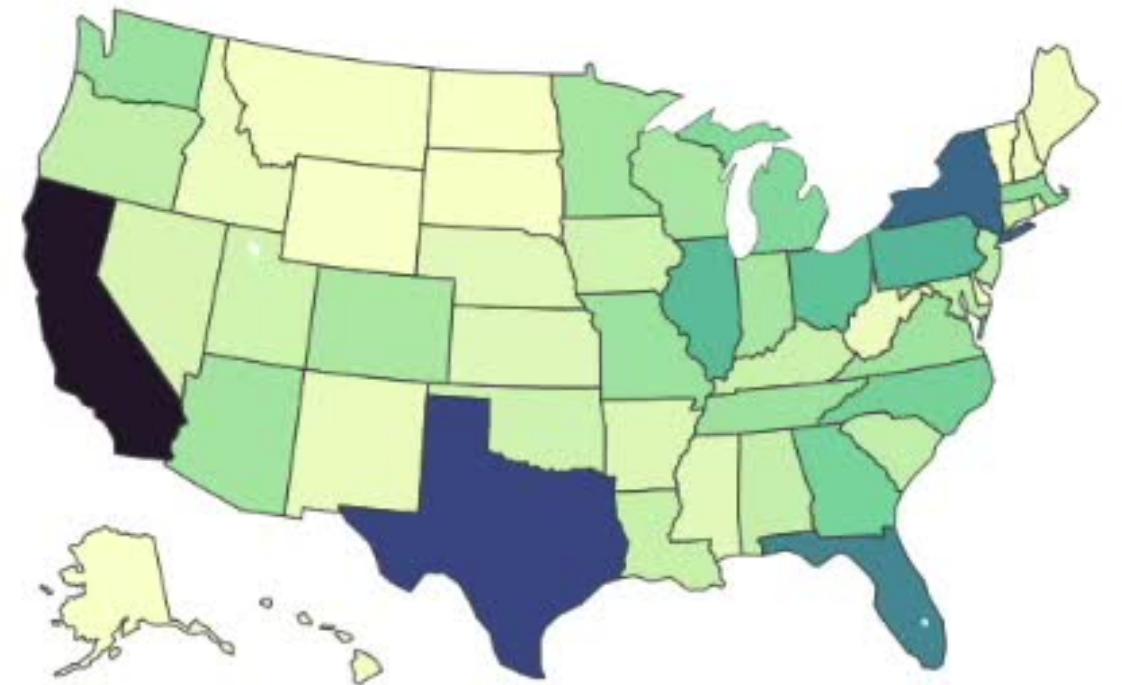


Top 20 jobs with highest Total employment number of Engineers



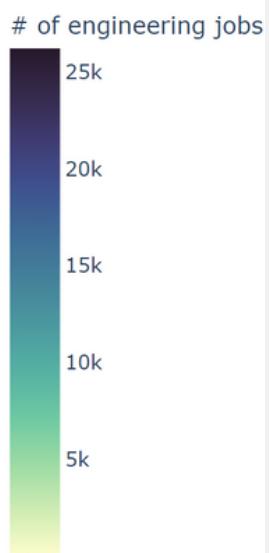
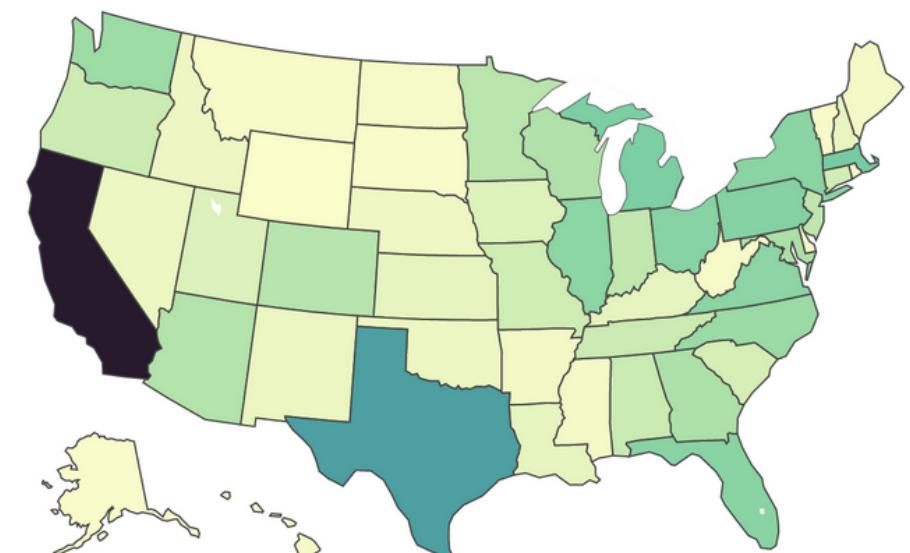
- The top 3 highest employment jobs are :
 - Retail Salesperson
 - Fast Food and Counter Workers
 - Cashiers
 - 1 engineering-related job is on the list:
 - Software Developers and Software Quality Assurance Analysis and Testers
 - Most engineer-related occupations which have highest employment number are in computer domains

Total employment number of All Occupations in Different States



Employment - States

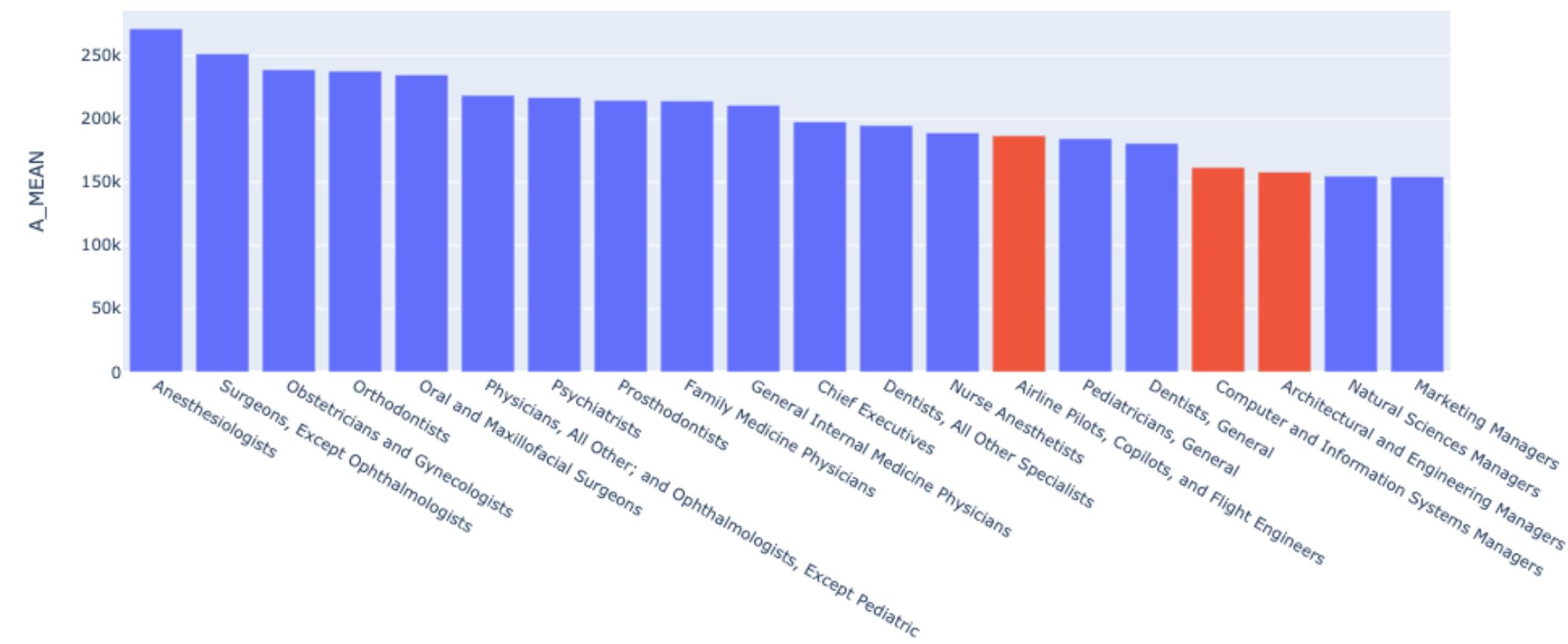
- Top 5 popular locations:
 - California (32.06 million)
 - Texas (23.54 million)
 - New York (19.86 million)
 - Florida (16.28 million)
 - Pennsylvania (11.49 million)
- Engineer-related occupations follow the same pattern as all occupations
- Number of job openings follow the same pattern as employment numbers



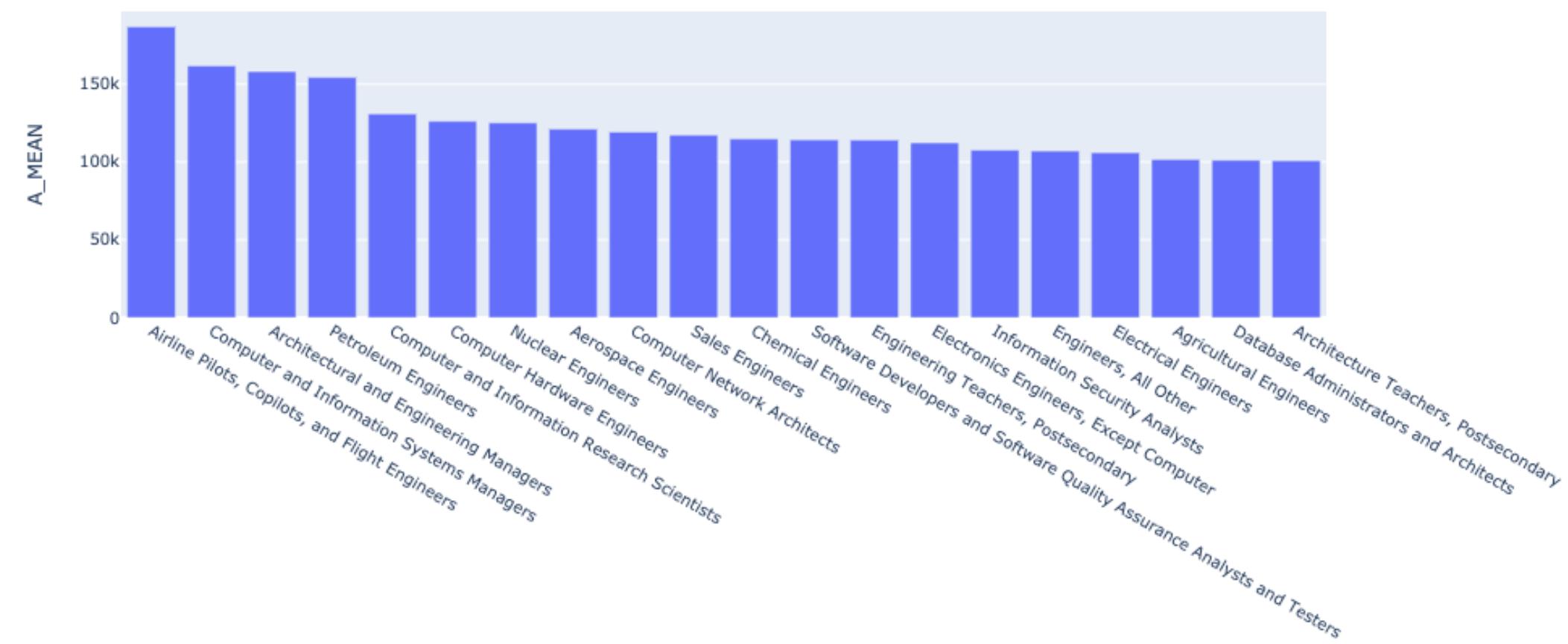
Wage - Mean annual wage U.S.

- Top 20 highest paying jobs are mostly medical-related jobs:
 - surgeons
 - physicians
 - oral doctors
- 3 engineering-related jobs are on the list:
 - Airline pilot, copilots, and Flight engineers
 - Computer and Information systems managers
 - Architectural and engineering managers

Top 20 jobs with highest Mean annual wage of All Occupations



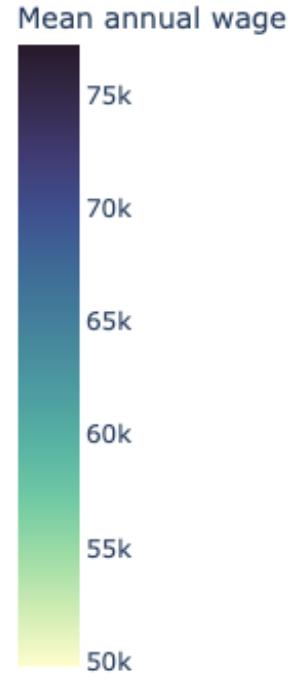
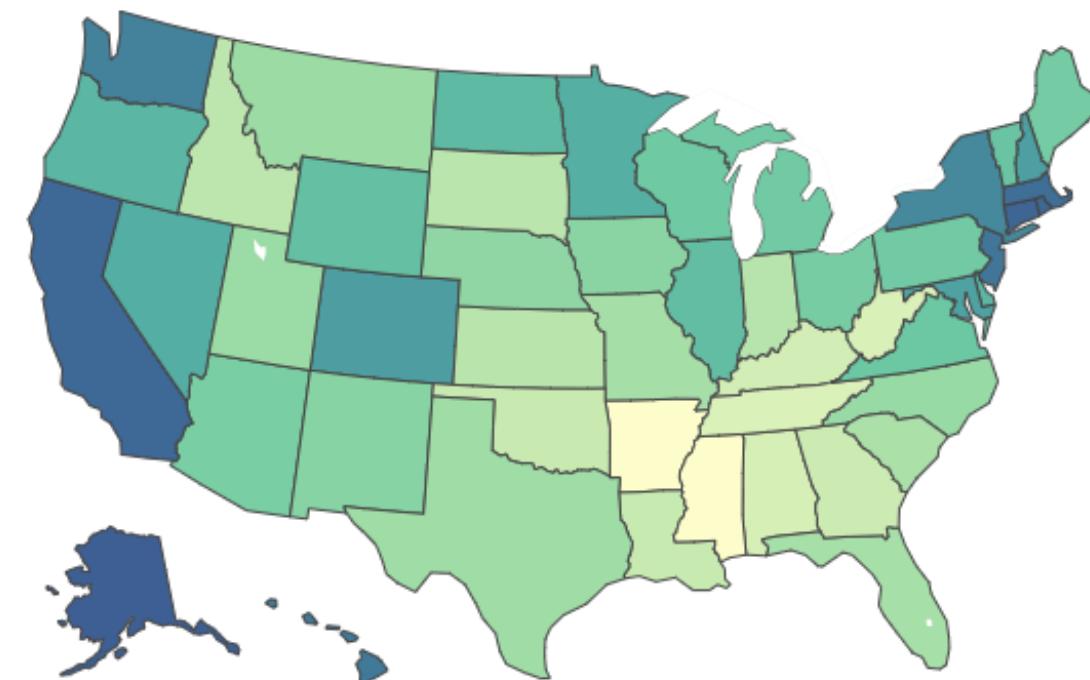
Top 20 jobs with highest Mean annual wage of Engineers



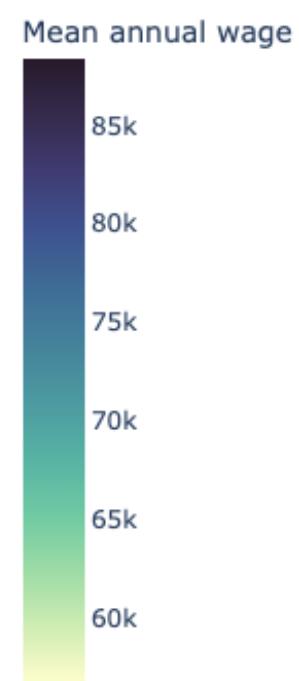
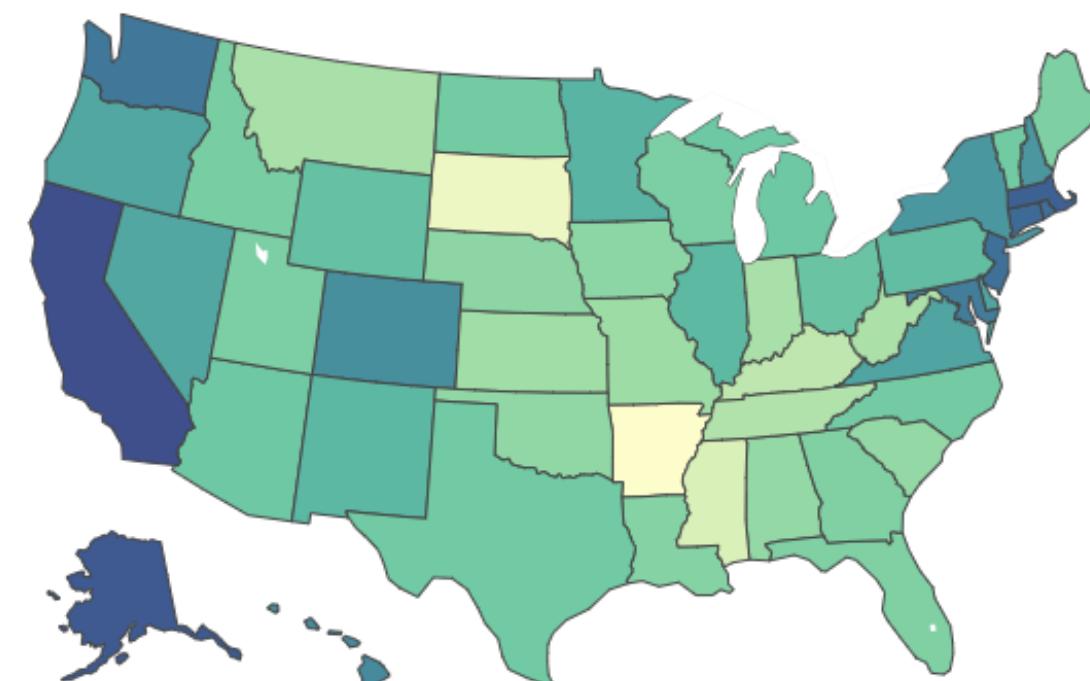
Wage - Mean annual wage States

- For all occupations, high paying jobs are mostly in these states:
 - Alaska (68.46k)
 - Connecticut (67.92k)
 - California (67.67k)
 - Rhode Island (67.74k)
 - Massachusetts (67.01)
- For engineering-related jobs:
 - California (80.15k)
 - Alaska (78.89k)
 - Massachusetts (78.03k)
 - Connecticut (77.00k)
 - Rhode Island (76.32k)

Mean annual wage of All Occupations in Different States



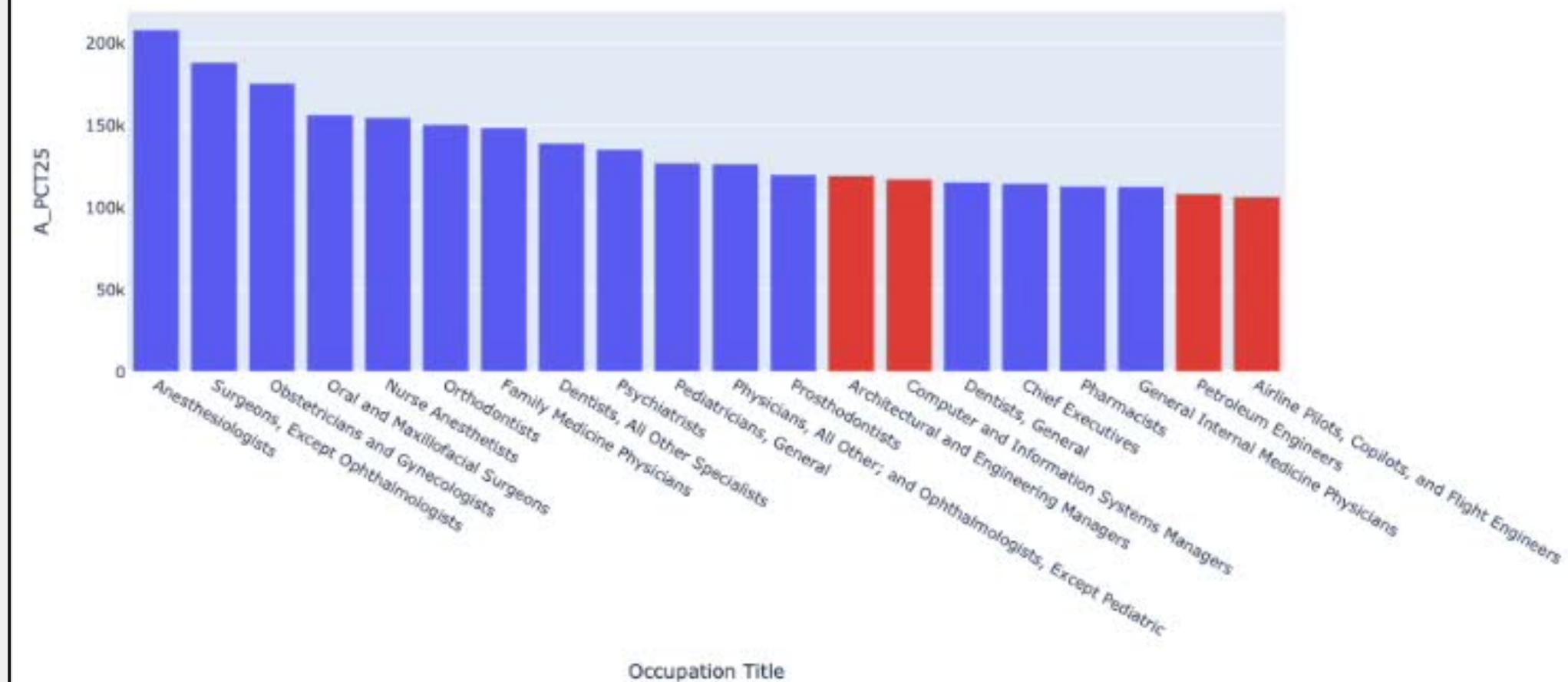
Mean annual wage of Engineers in Different States



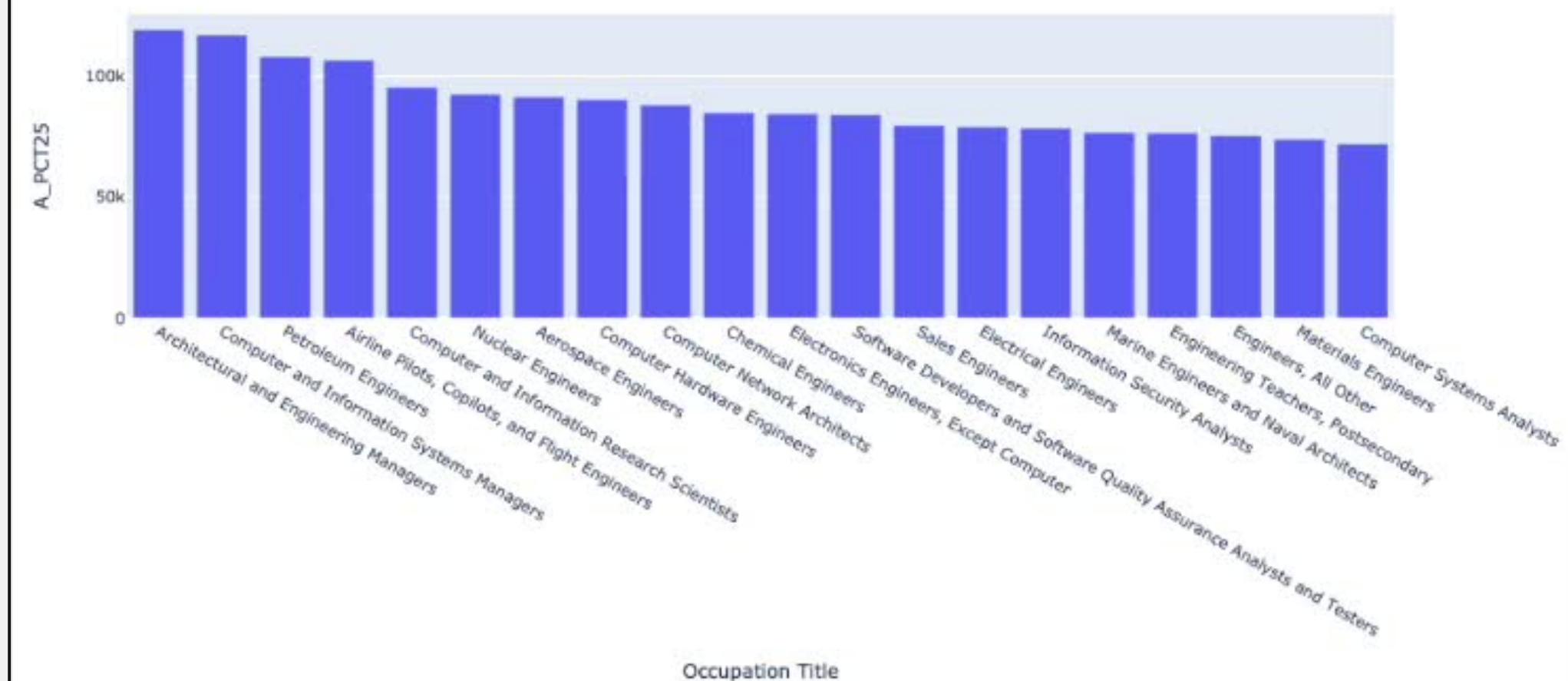
Wage - Annual 25%/50%/75% wage U.S.

- 25 percentile: low wage group
- 50 percentile: medium wage group
- 75 percentile: high wage group
- 2 engineering-related jobs are always on the list:
 - Airline pilot, copilots, and Flight engineers
 - Computer and Information systems managers
- Their salary is always better than their peers in every wage group

Top 20 jobs with highest Annual 25th percentile wage of All Occupations



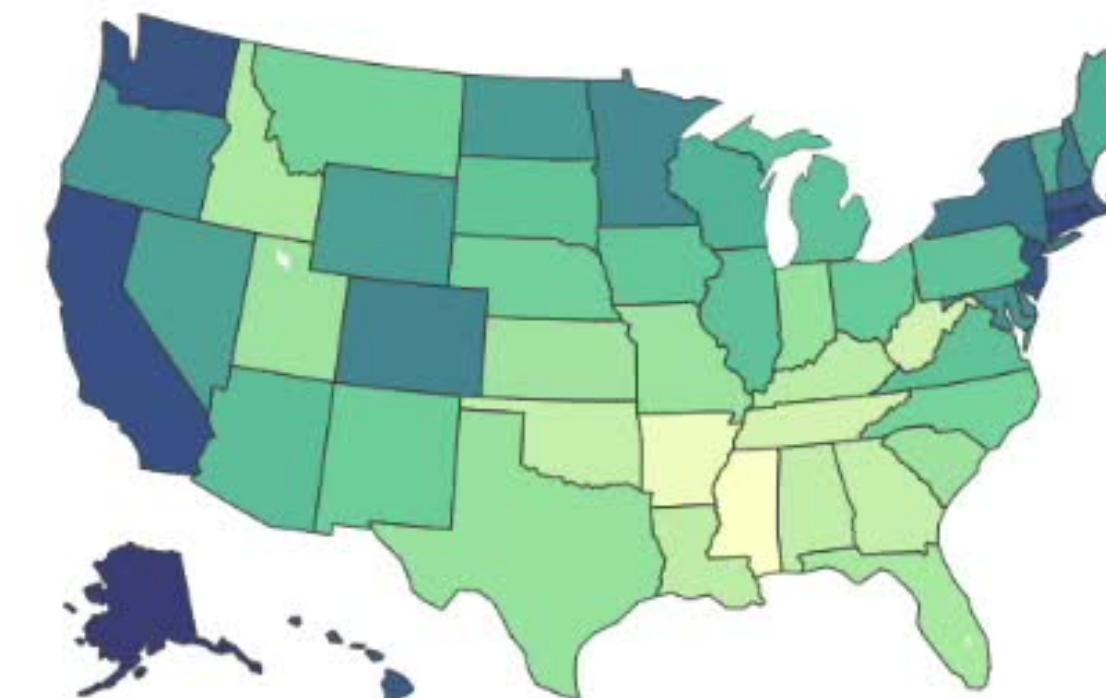
Top 20 jobs with highest Annual 25th percentile wage of Engineers



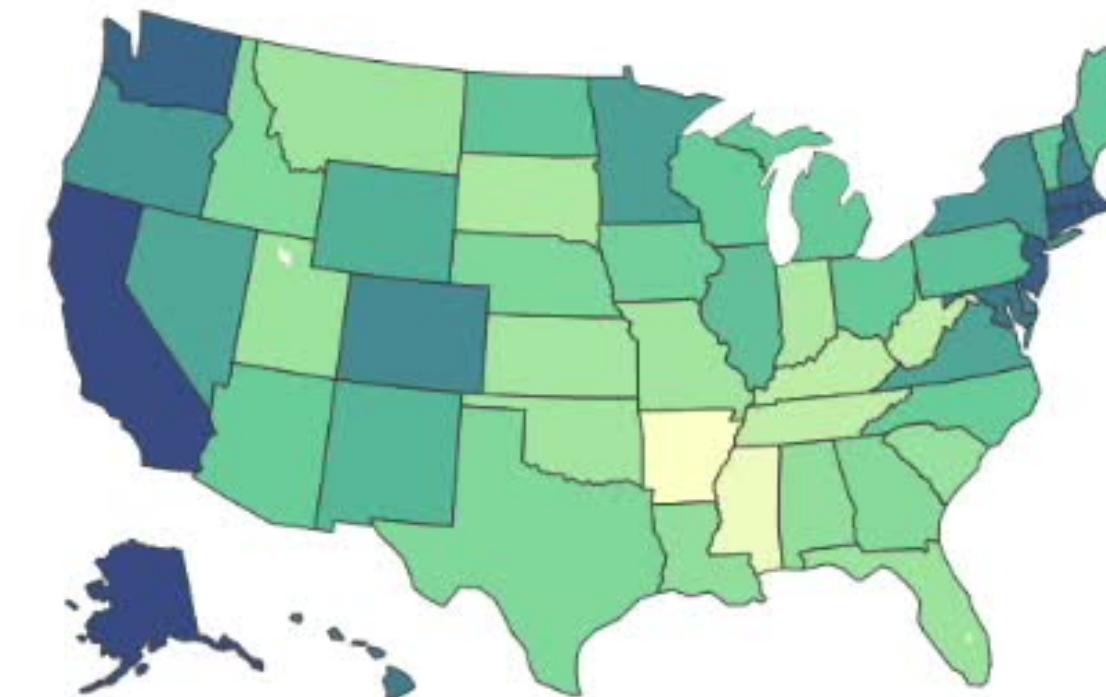
Wage - Annual 25%/50%/75% wage States

- For all occupations and engineer-related occupations, data in these states are always high:
 - California
 - Alaska
 - Connecticut
 - Massachusetts
 - Rhode Islands
 - Washington
 - New Jersey
- Basically same states as Annual mean wage
- No matter what percentile wage (Good location for jobs!)

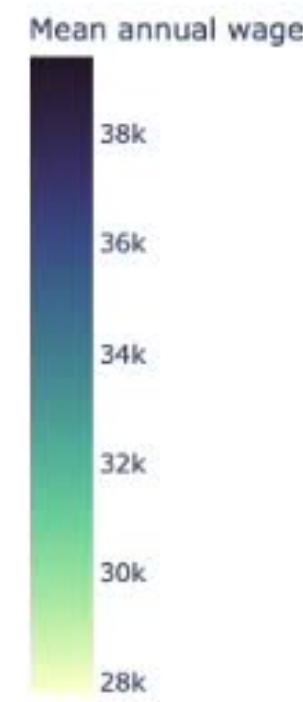
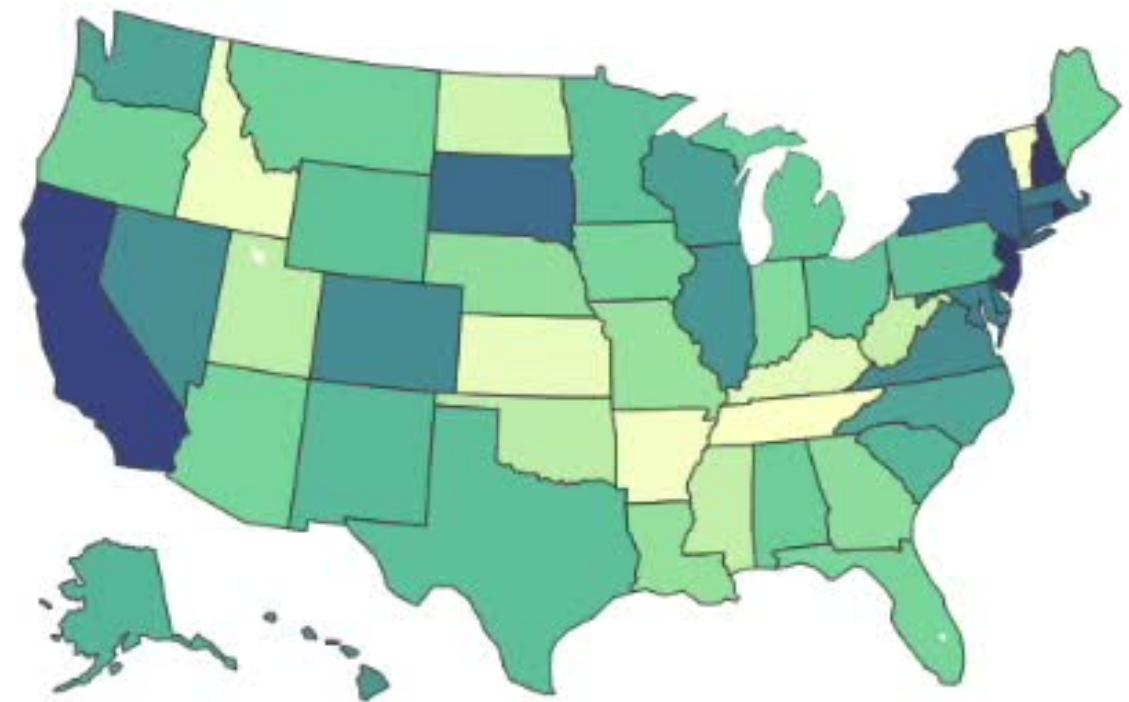
Annual 25th percentile wage of All Occupations in Different States



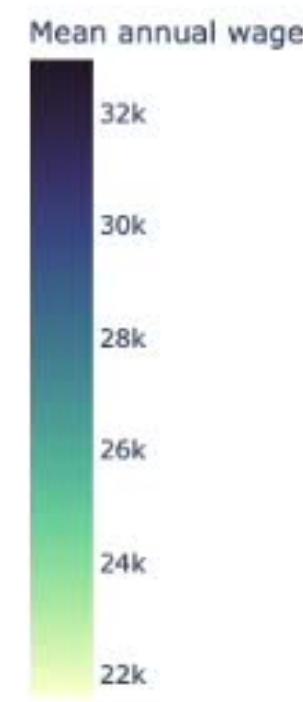
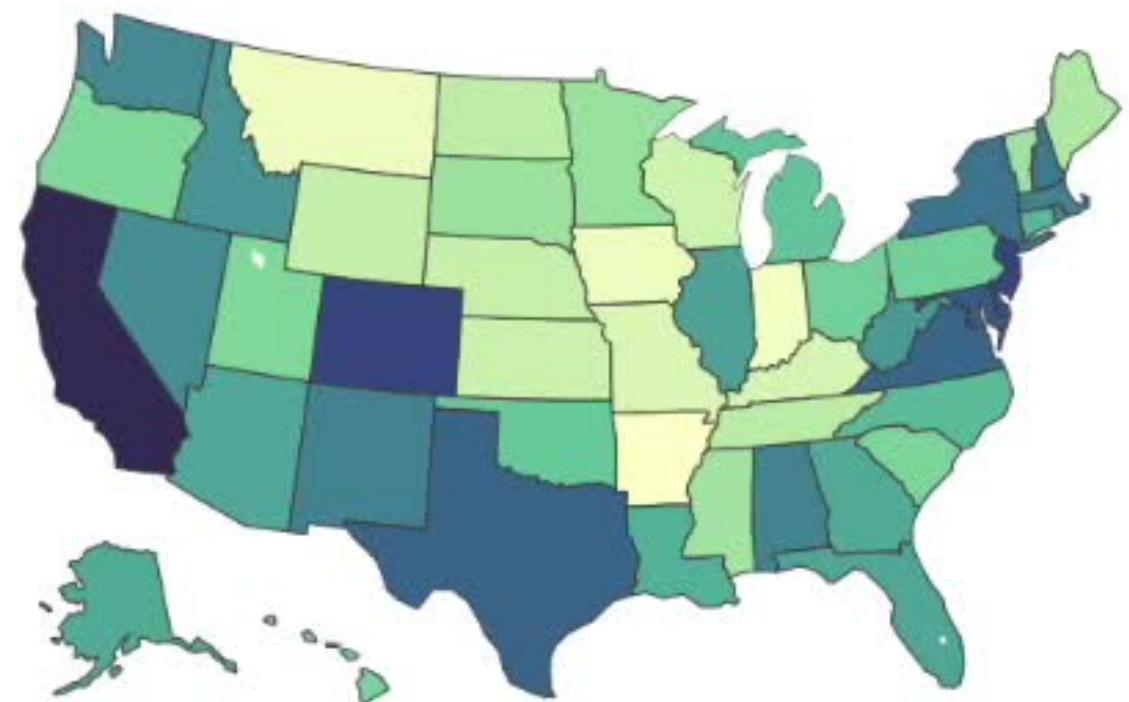
Annual 25th percentile wage of Engineers in Different States



Mean annual wage of All Occupations in Different States



Mean annual wage of Engineers in Different States



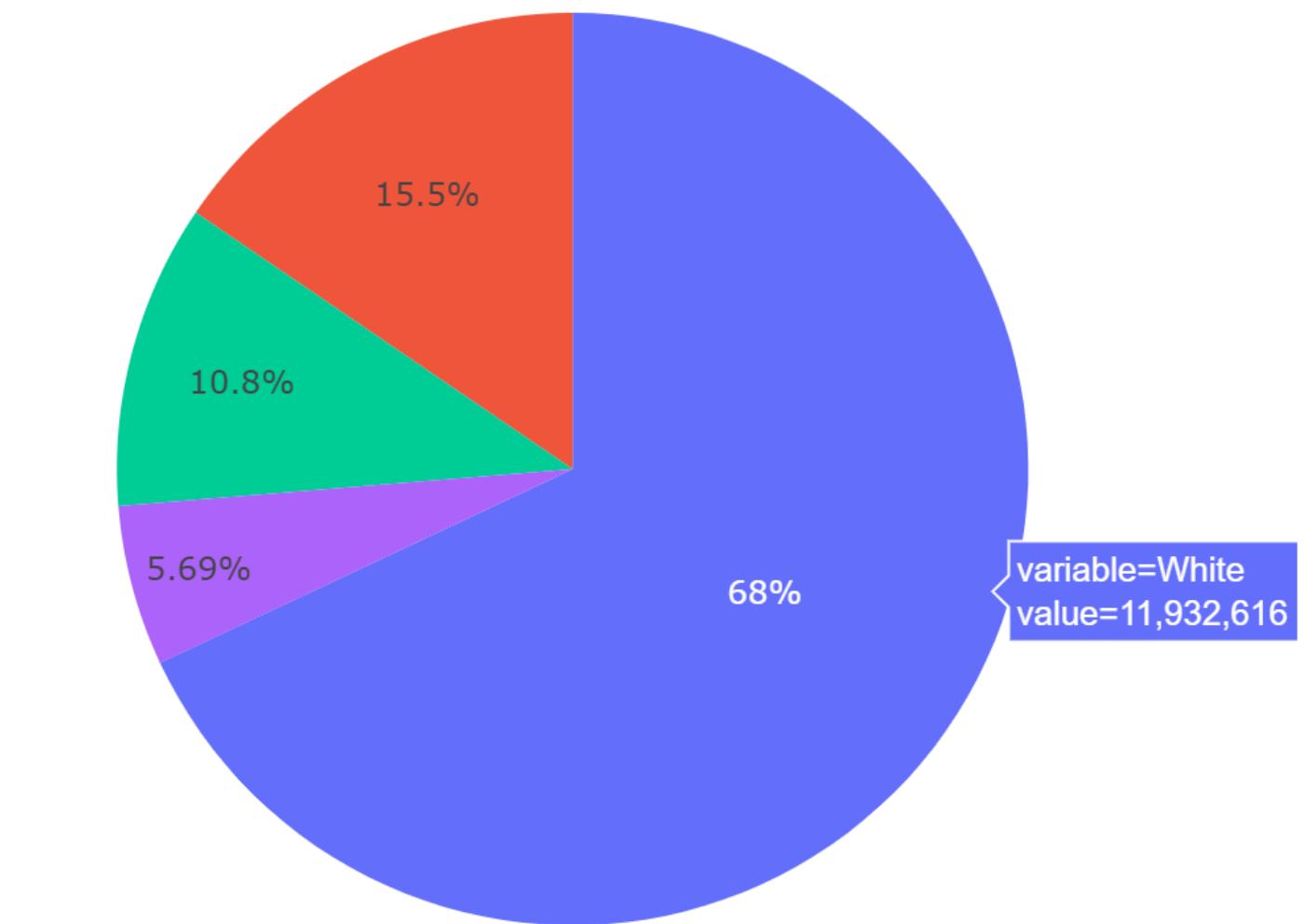
Wage - Standard Deviation States

- For all occupations, they can have a large discrepancy in states like Rhode Island, New Hampshire, New Jersey, and California
 - Upper area of the map
- For engineer-related occupations, states with a large wage discrepancy are: California, Texas, New Jersey, and Colorado (wage can be very high in the higher group)
 - Lower area of the map

Employment by Race

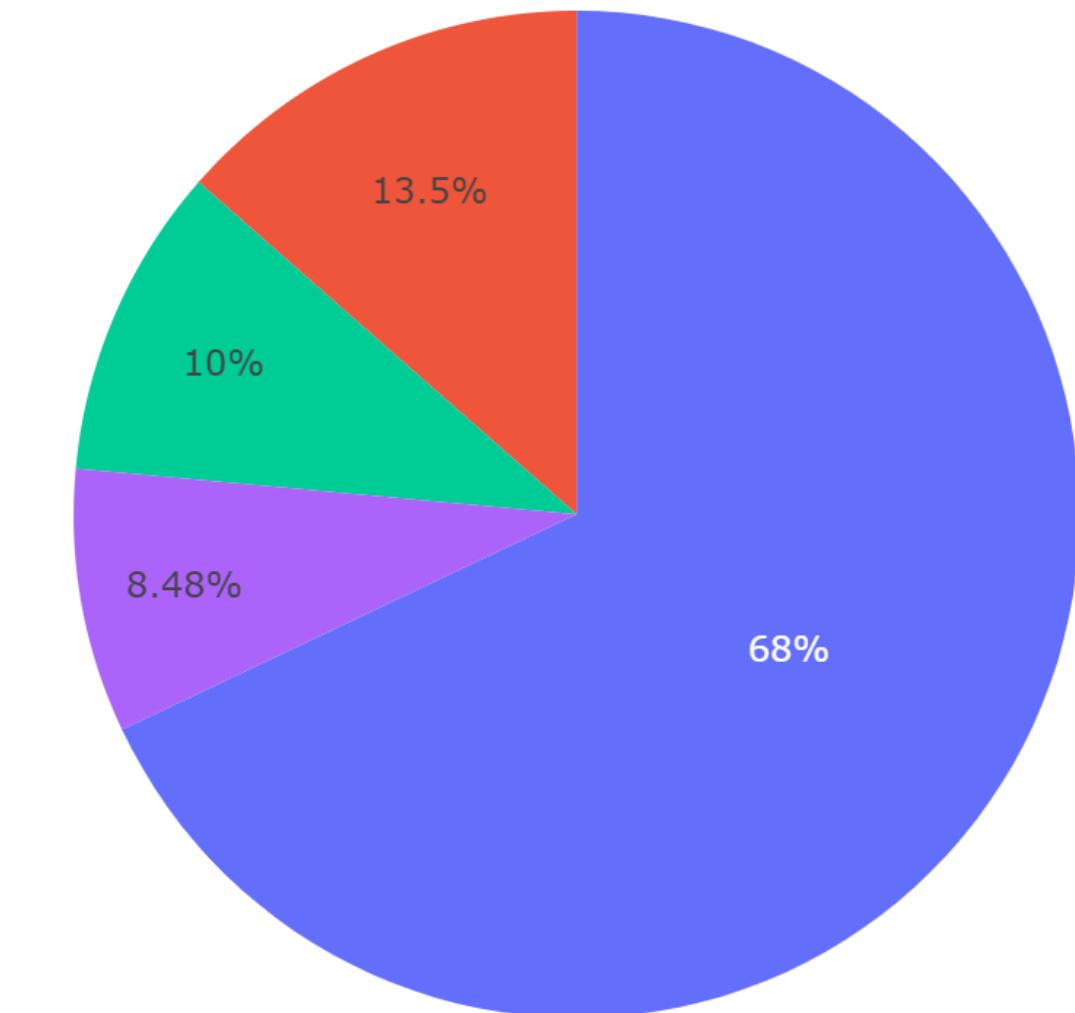
For all occupations

- White
- Hispanic or Latino ethnicity
- Black or African American
- Asian



*For all engineering
related occupations*

- White
- Asian
- Hispanic or Latino ethnicity
- Black or African American



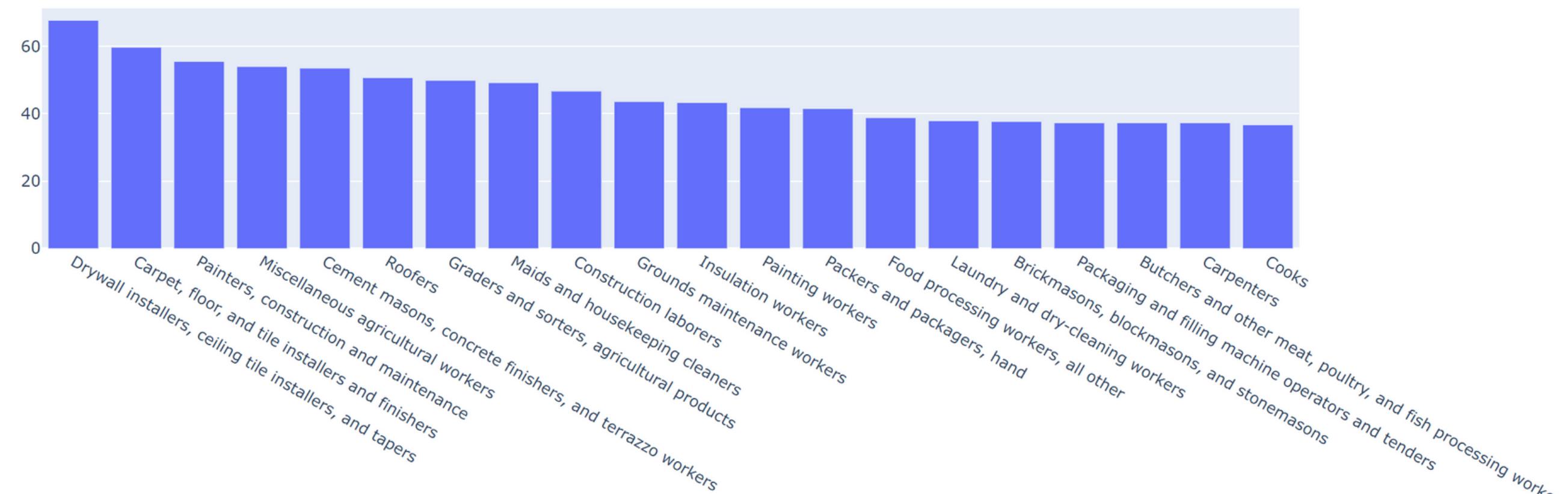
Employment by Race



Top 20 Occupations by Black or African American percent of total employed



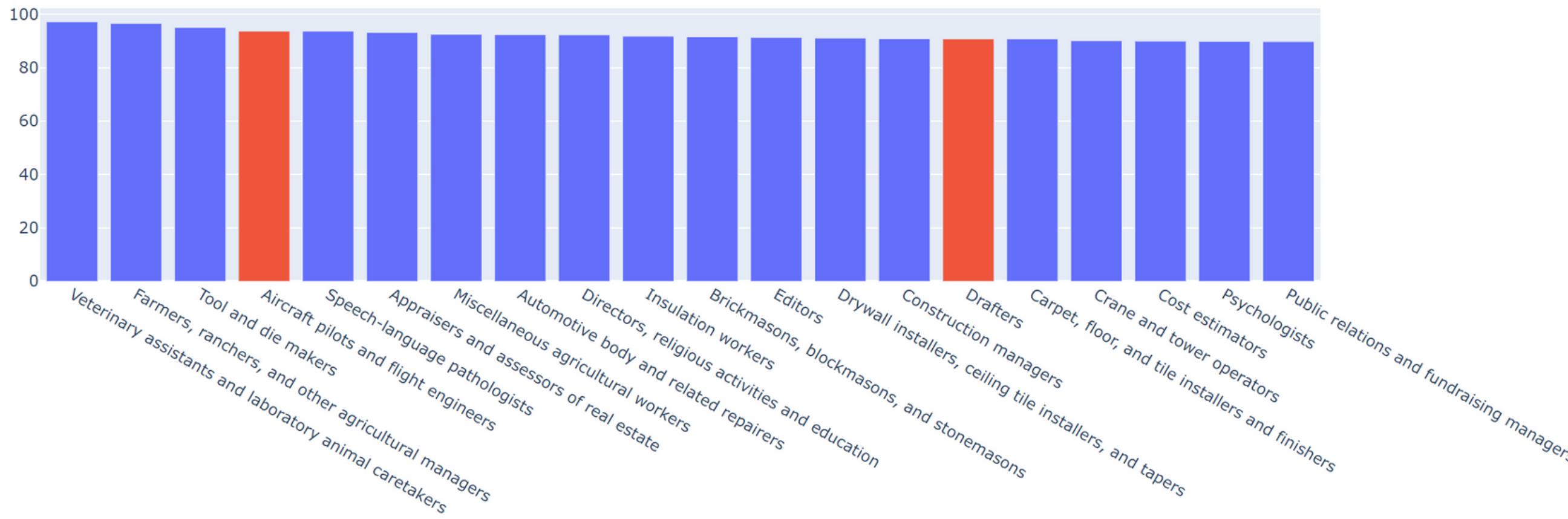
Top 20 Occupations by Hispanic or Latino ethnicity percent of total employed



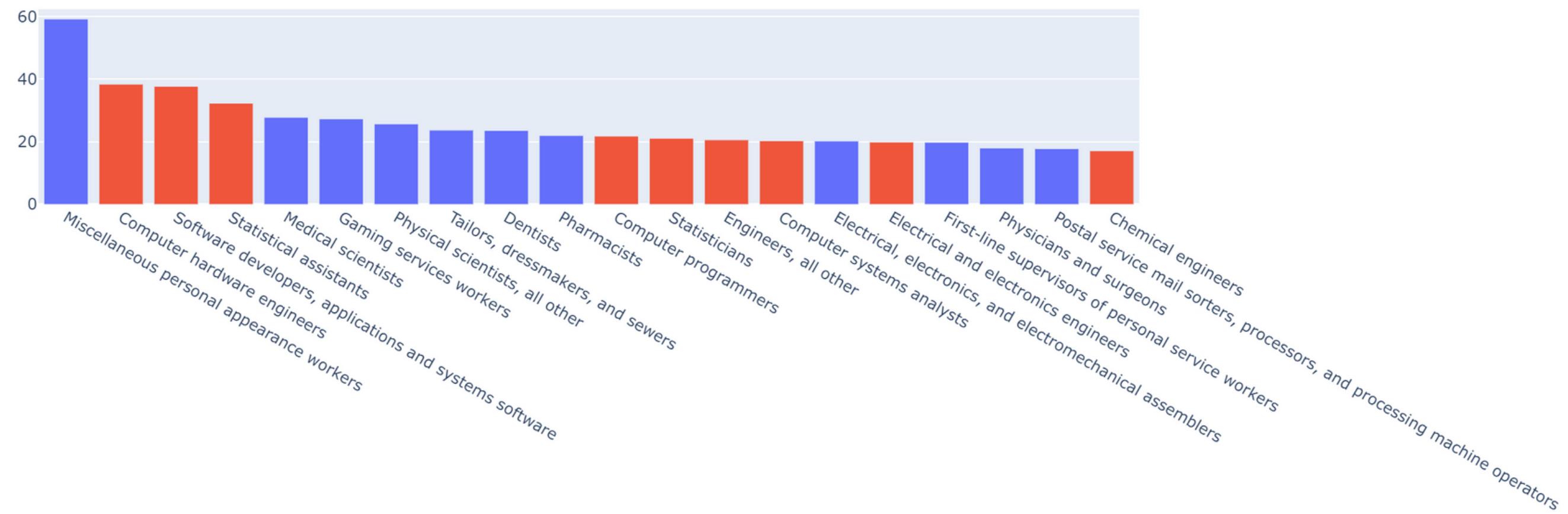
Employment by *Race*



Top 20 Occupations by White percent of total employed

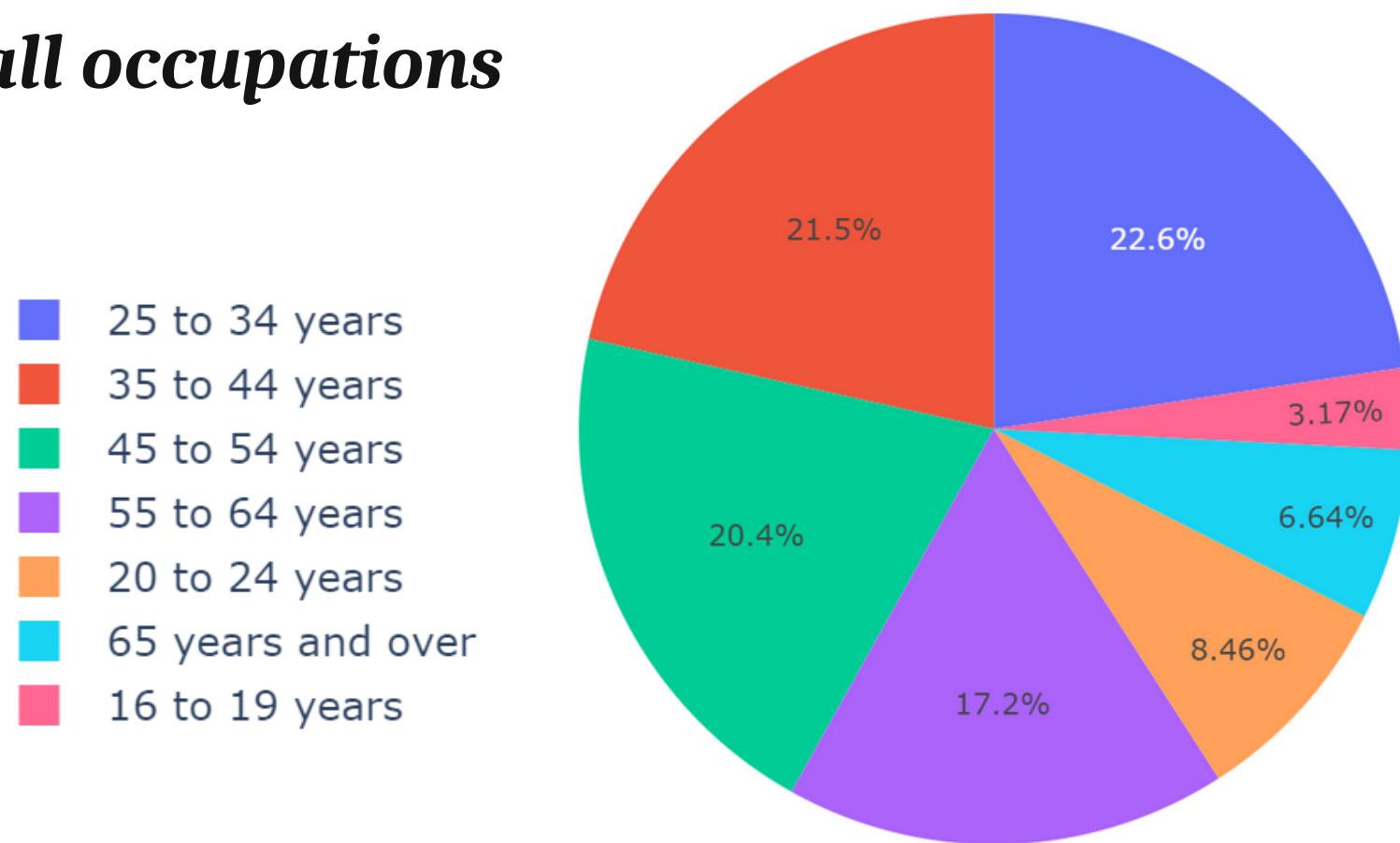


Top 20 Occupations by Asian percent of total employed

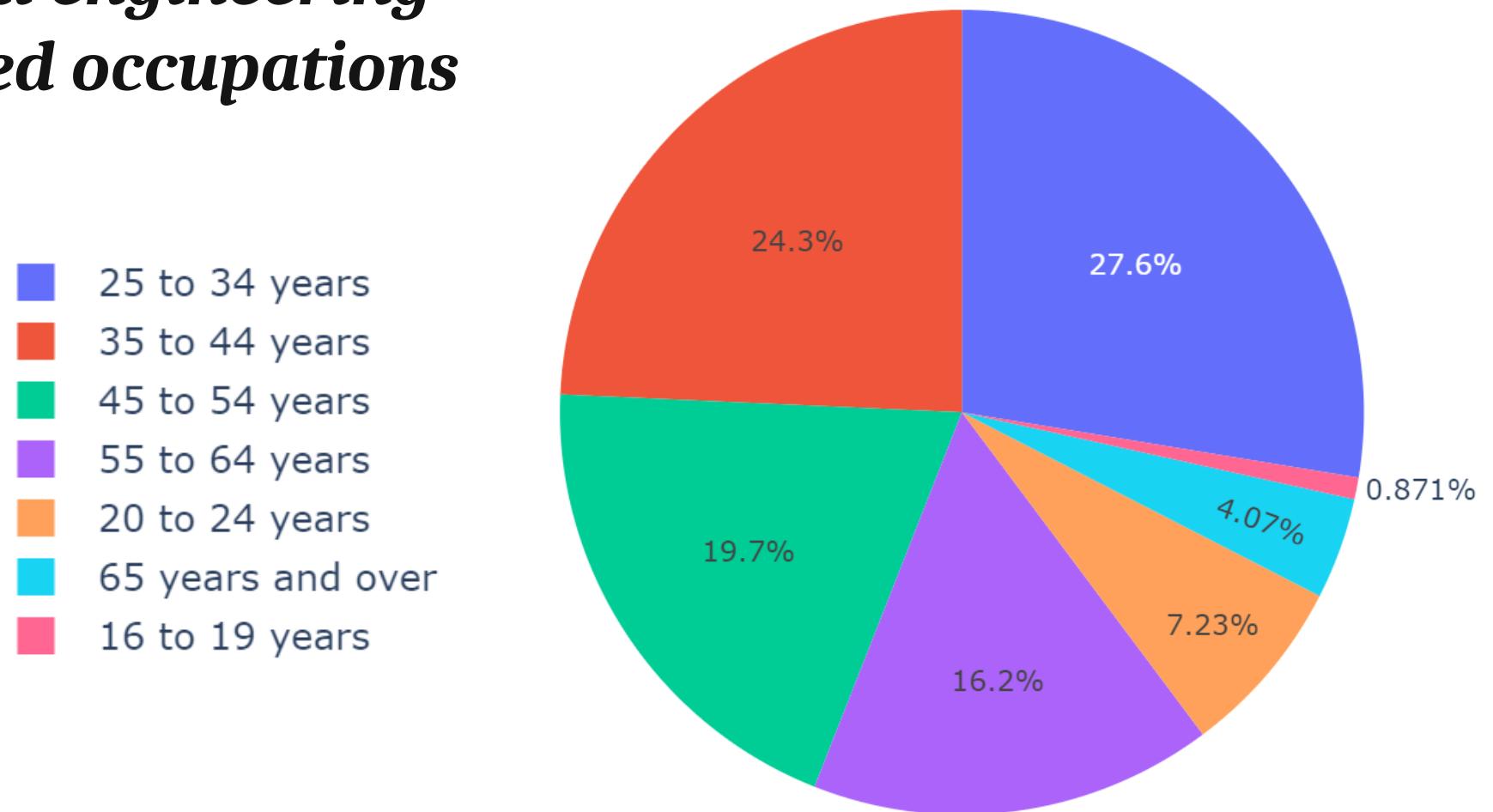


Employment by Age

For all occupations



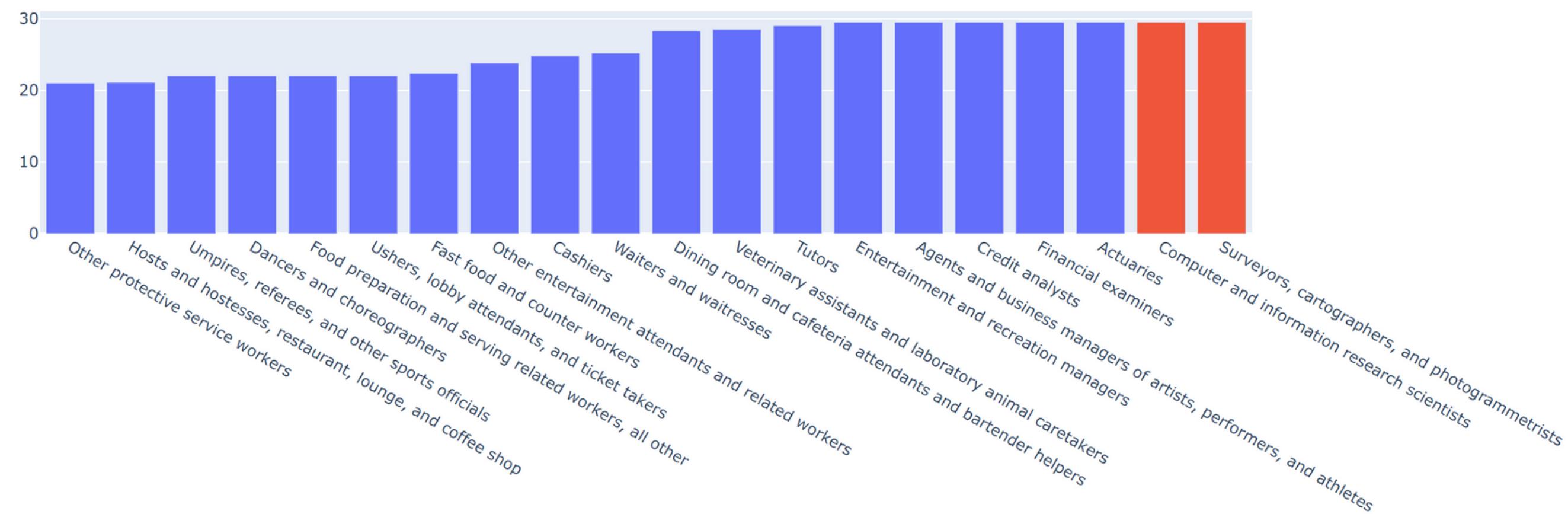
*For all engineering
related occupations*



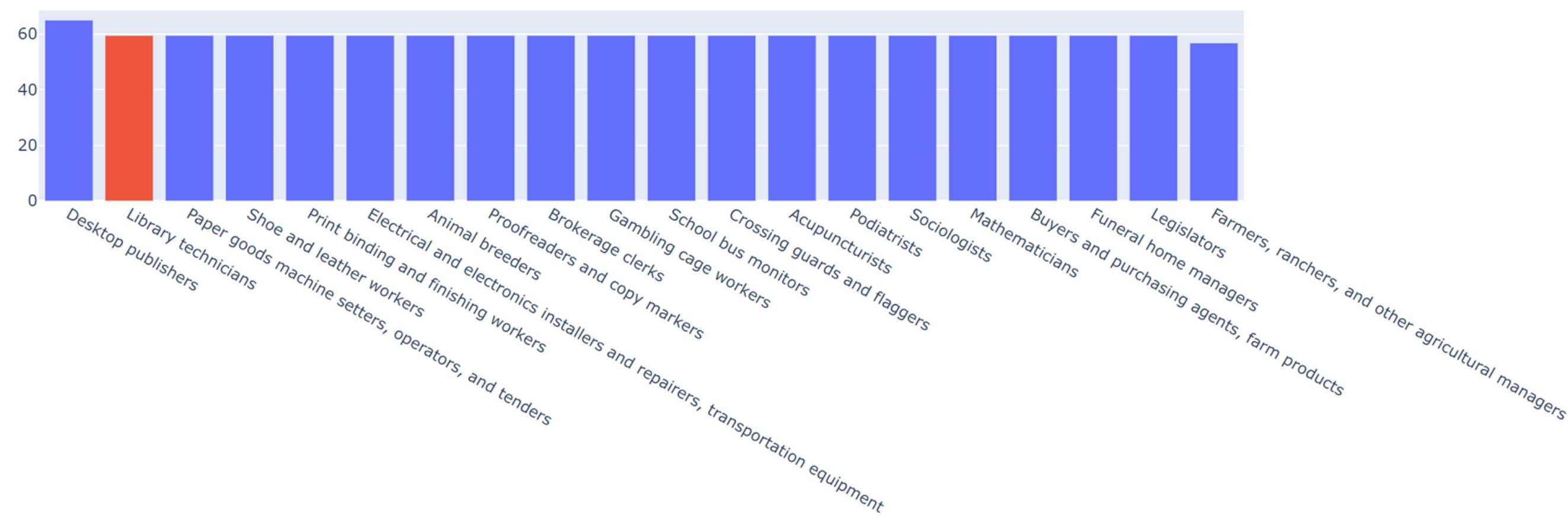
Employment by Age



Youngest 20 Occupations by Median age



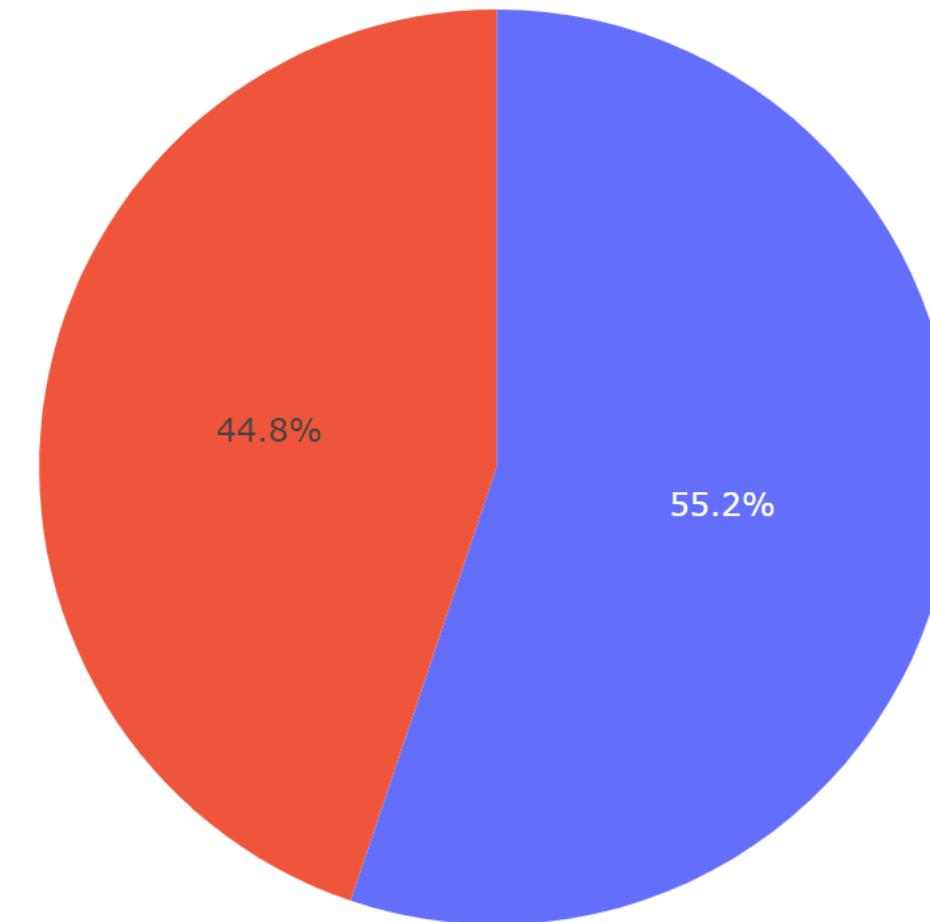
Oldest 20 Occupations by Median age



Employment by Gender

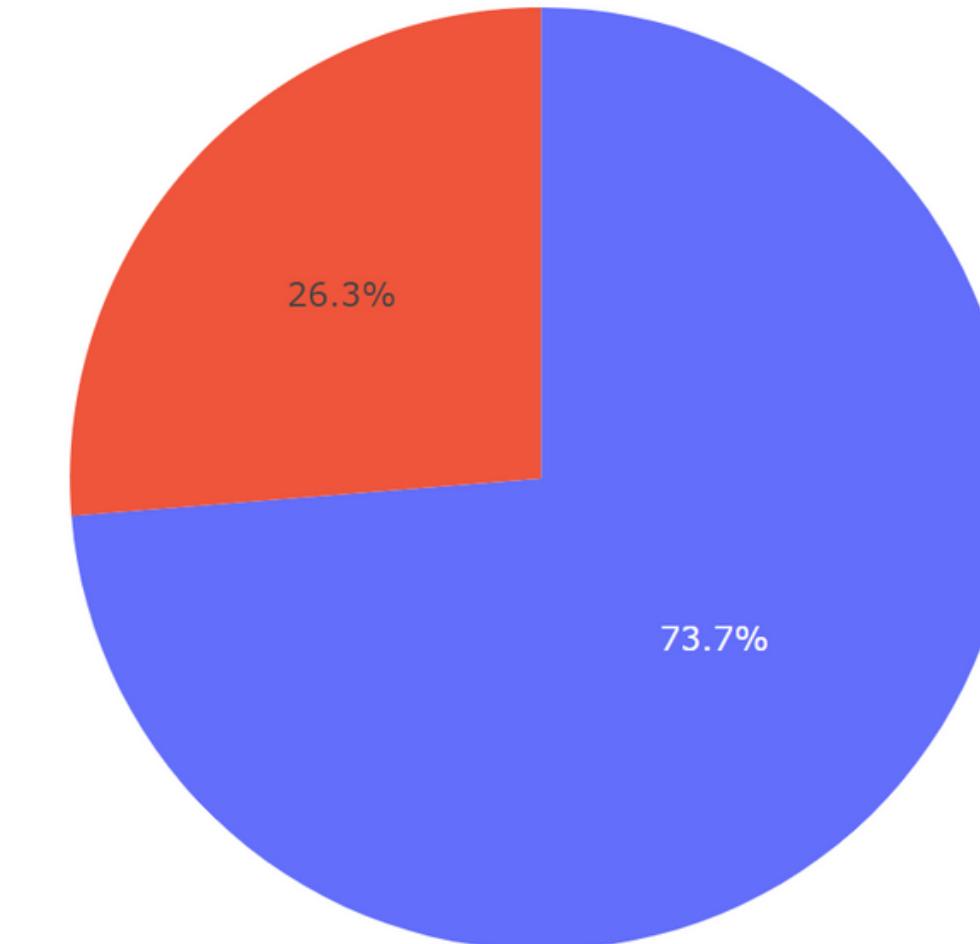
For all occupations

- Number of male workers
- Number of female workers



*For all engineering
related occupations*

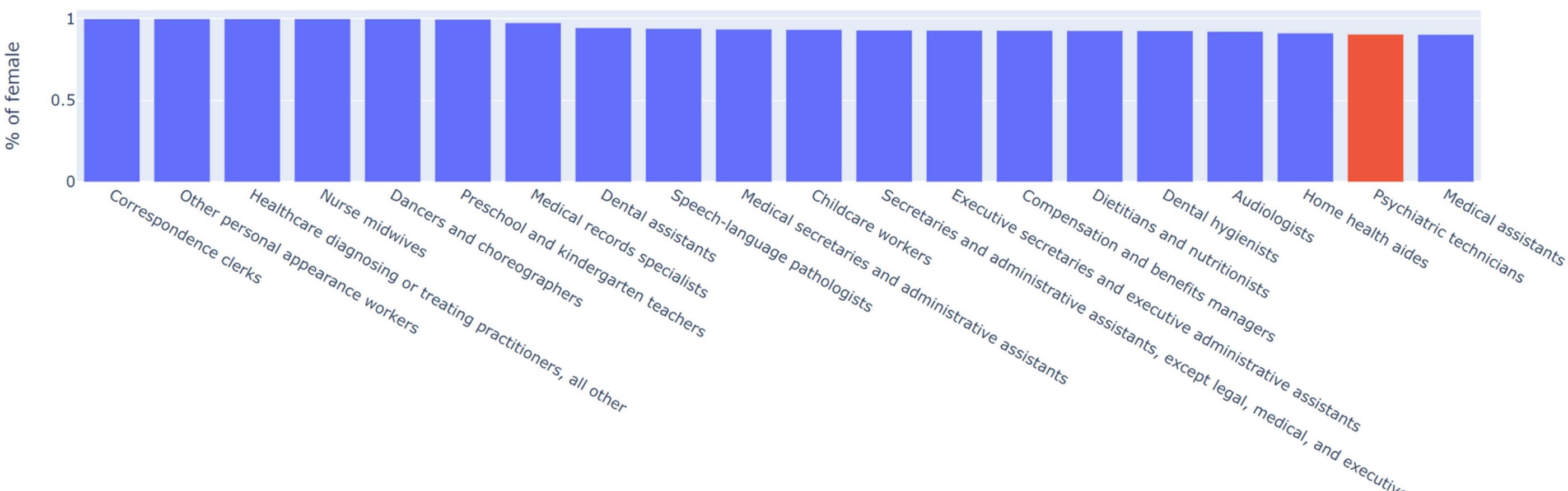
- Number of male workers
- Number of female workers



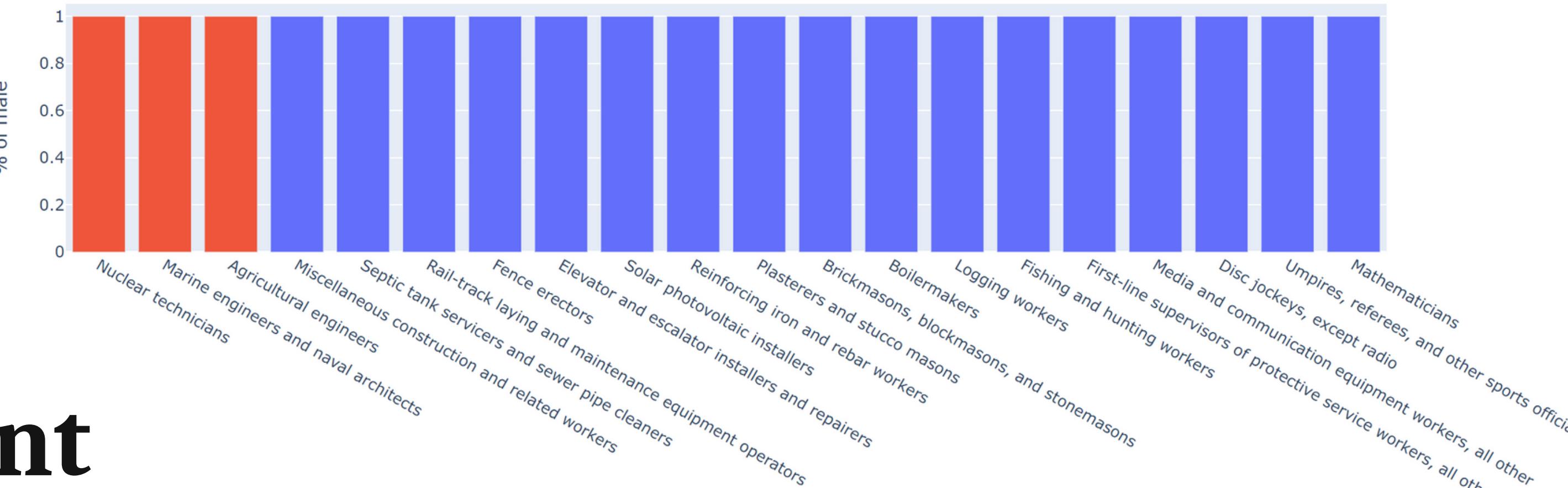
Employment by Gender



Top 20 Occupations by % of female



Top 20 Occupations by % of male

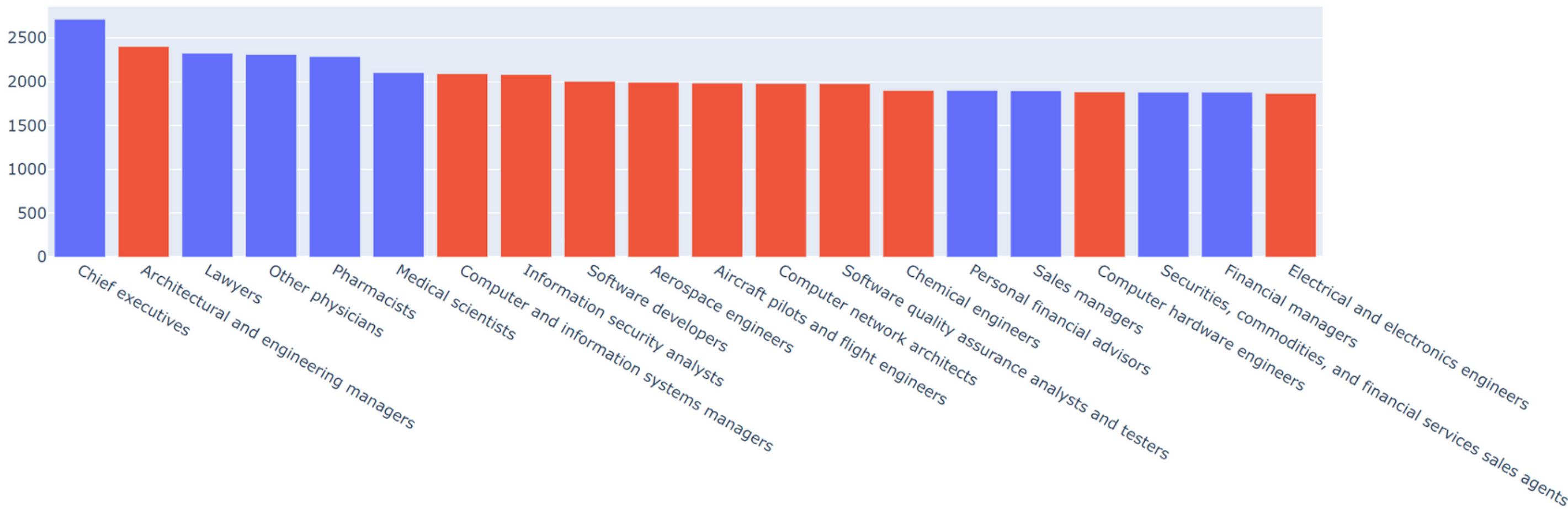


Earnings by Gender



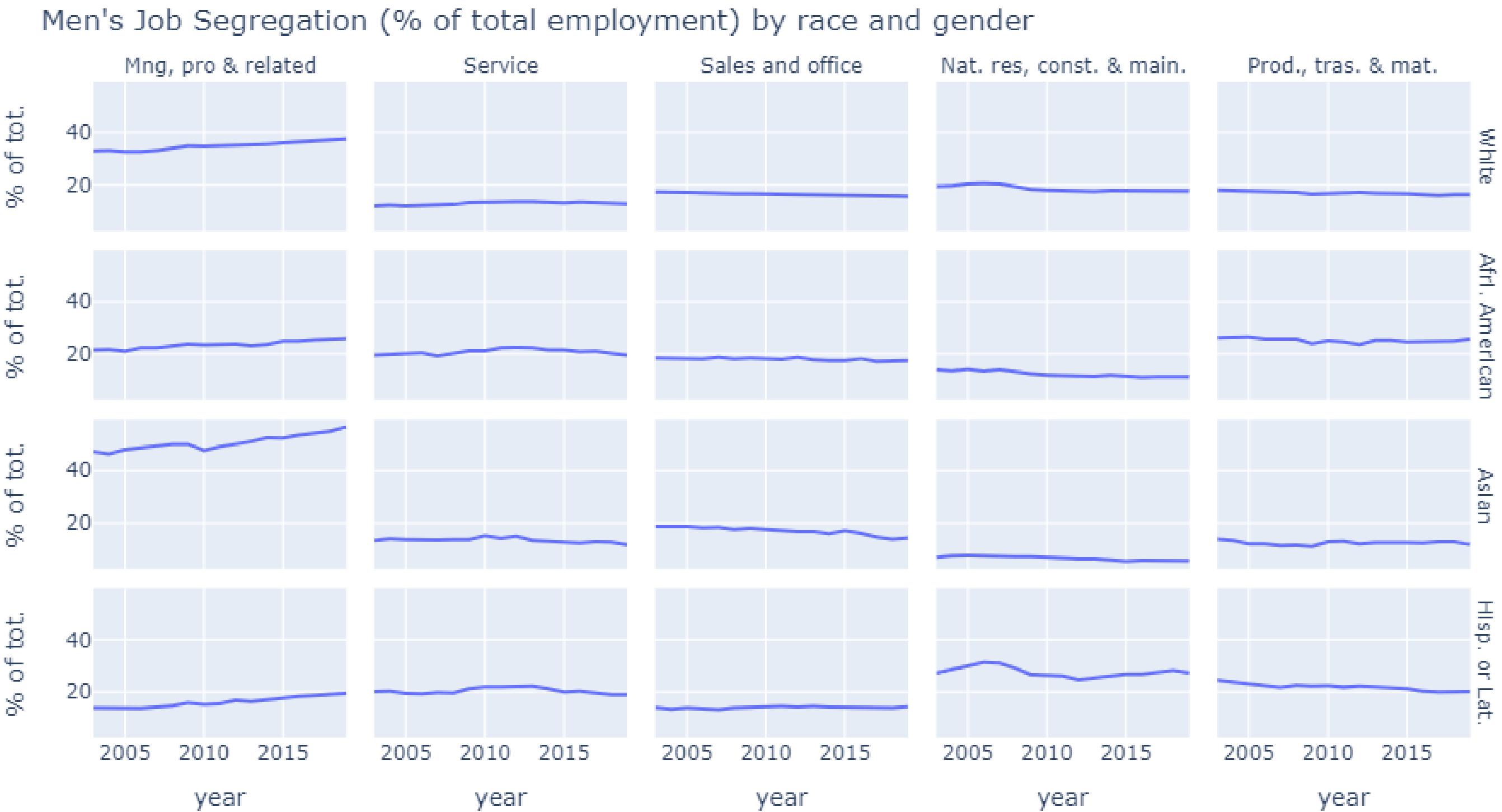
Women earnings as a percentage of men: 84.1%

Top 20 Occupations by Median weekly earnings of male workers



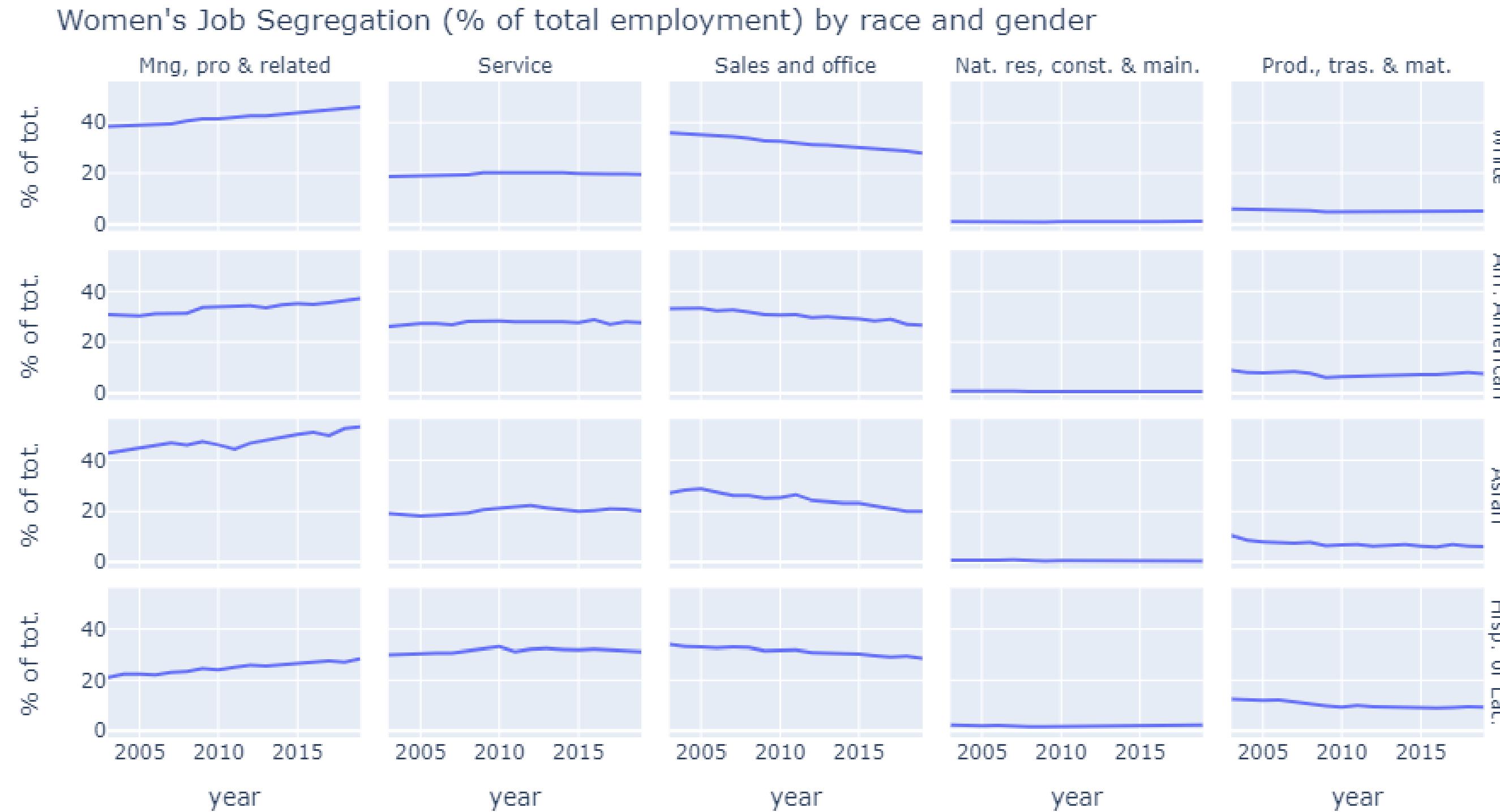
Top 20 Occupations by Median weekly earnings of female workers

Historical Series of Job Segregation by Race and Gender (Men)



Time Series Analysis

Historical Series of Job Segregation by Race and Gender (Women)



Time Series Analysis

Part 4

Legal, regulatory and ethical considerations



Legal and regulatory considerations

Which set of data regulation could be applied to our data sets?

- not HIPPA: our data is not gathered by hospital or healthcare provider
- not FERPA: not part of a student educational record
- not FCRA: our data is not being used for offering credit or for hiring background checks

Data Privacy Concern

Is the data personally-identifiable?

- "-": data is omitted when there are less than 50,000 observations
- "#": data is omitted when wages are too high

Data from BLS, CPS and GDPR

- ✓ Broad Applicability
- ✓ Informed consent, withdraw consent, transparency
 - Responses are obtained by mail, Internet or other electronic means, email, telephone, or personal visit.
- ✓ Obligations to maintain data security



Data from Indeed and GDPR

- ✓ Broad Applicability
- ? Informed consent, withdraw consent, transparency
 - ✓ First type: information from resumes that job seekers have uploaded to Indeed's resume database
 - ? Second type: collects job postings anywhere on the internet
- ✓ Obligations to maintain data security

Limitations

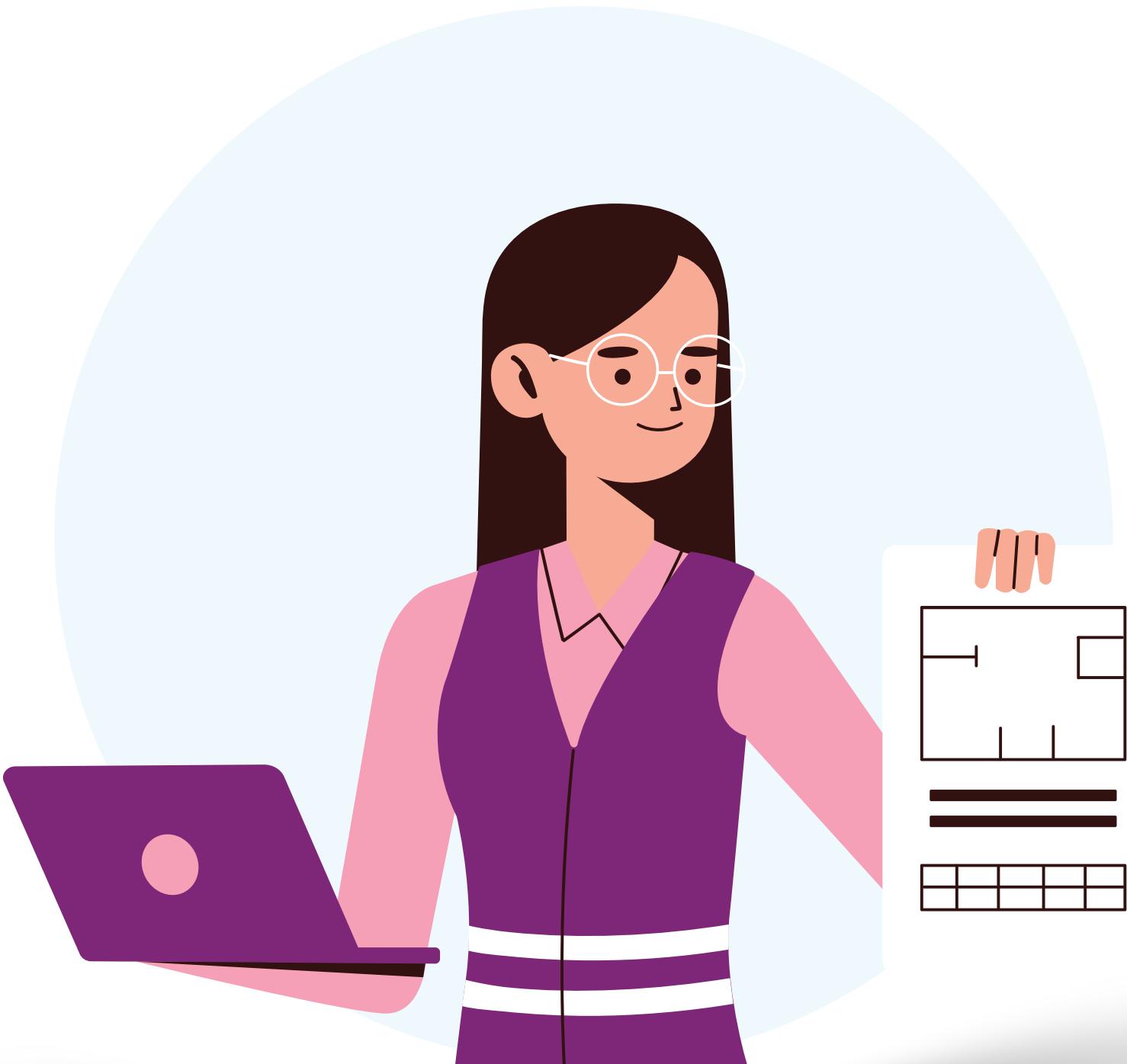
- Selection bias
 - Sampling bias
 - Certain occupations may not be sampled because of fewer workers in the industry
 - Response rate may vary
- Data bias
 - Missing values
 - high income
 - few observations

Ethical Checklist

- ✓ Privacy
 - ? Appropriate user consents
 - ✓ First type: information from resumes that job seekers have uploaded to Indeed's resume database
 - ? Second type: collects job postings anywhere on the internet
 - ? Systems and processes to collect data are not against any group
 - may be biased against certain occupations with fewer workers
- ✓ understand the bias in our data

Part 5

Business Demo



HIRED

YouAreHired

YouAreHired Occupation Analysis System

Type your occupation... Choose an area you want to know... Confirm

Hot Search

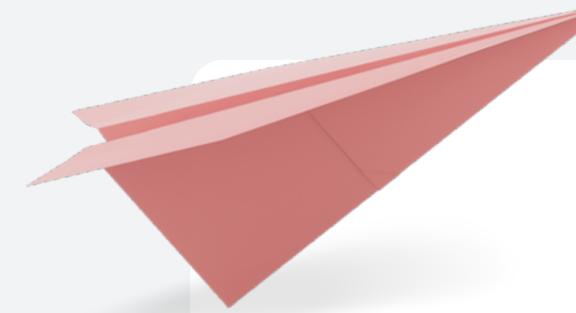
Engineer Developer Chief executive Product manager

Management Statistician Business Analyst Data scientist

Job Forum FAQs SIGN UP OR LOGIN

D2E2M0O

The Team 8



Thank you!

We are open to questions!



For more detailed information, go to YouAreHired.com

Our Demo

A screenshot of a Google Chrome browser window. The title bar shows 'Chrome' and the date 'Mon Nov 15 7:46 PM'. The address bar displays 'YouAreHired.com https://youarehired.com/versio...'. The page content is the YouAreHired Occupation Analysis System homepage.

The page features a large 'HIRED' logo in a red box at the top left. At the top right are links for 'Job Forum', 'FAQs', and a prominent green 'SIGN UP OR LOGIN' button. Below the login button is a large, stylized 'YouAreHired' logo. Underneath it, the text 'YouAreHired Occupation Analysis System' is displayed.

Two input fields are present: 'Type your occupation...' and 'Choose an area you want to know...'. To the right of these fields is a green 'Confirm' button. Below these fields is a section titled 'Hot Search' containing eight occupation names arranged in two rows of four.

Hot Search			
Engineer	Developer	Chief executive	Product manager
Management	Statistician	Business Analyst	Data scientist

一隻憂鬱的烏龜

哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈哈还

Our data And GDPR (Indeed) personal identifiable

充滿藝術感的project

大家都用繁體就不是了！

- ✓ **Broad Applicability** 有一说一这一页还挺有艺术感的
- ? **Informed consent, withdraw consent, Transparency**

- ✓ **First type: information from resumes that job seekers have uploaded to Indeed's resume database**
- ? **Second type: collects job postings anywhere on the internet** 睡了睡了 明天早上真的起得来吗 怎么聊这么多了xs

- ✓ **Obligations to maintain data security** 定好九點的鬧鐘 然後就硬起

我打繁體字是不是personal identifiable >< 笑死 朋友们 两点了 早点睡
這slides 做得好漂亮啊！好讚！ xs今夜无人入睡吗难道

你们为什么可以在这里聊天 因爲她真的做得很好啊 笑死

Job openings

