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California Wage Data Analysis
11/23/2022

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Overview

- Data Source: Quarterly Census of Employment and Wages (QCEW)

- Questions:
- 1. What is the major industry types of California?
- 2. What can we learn from the changing trend of employment of different ownership?
- 3. What are the correlations between the trend of establishments, wages and monthly employment?
- 4. Can we find out which industries are seasonal in nature?

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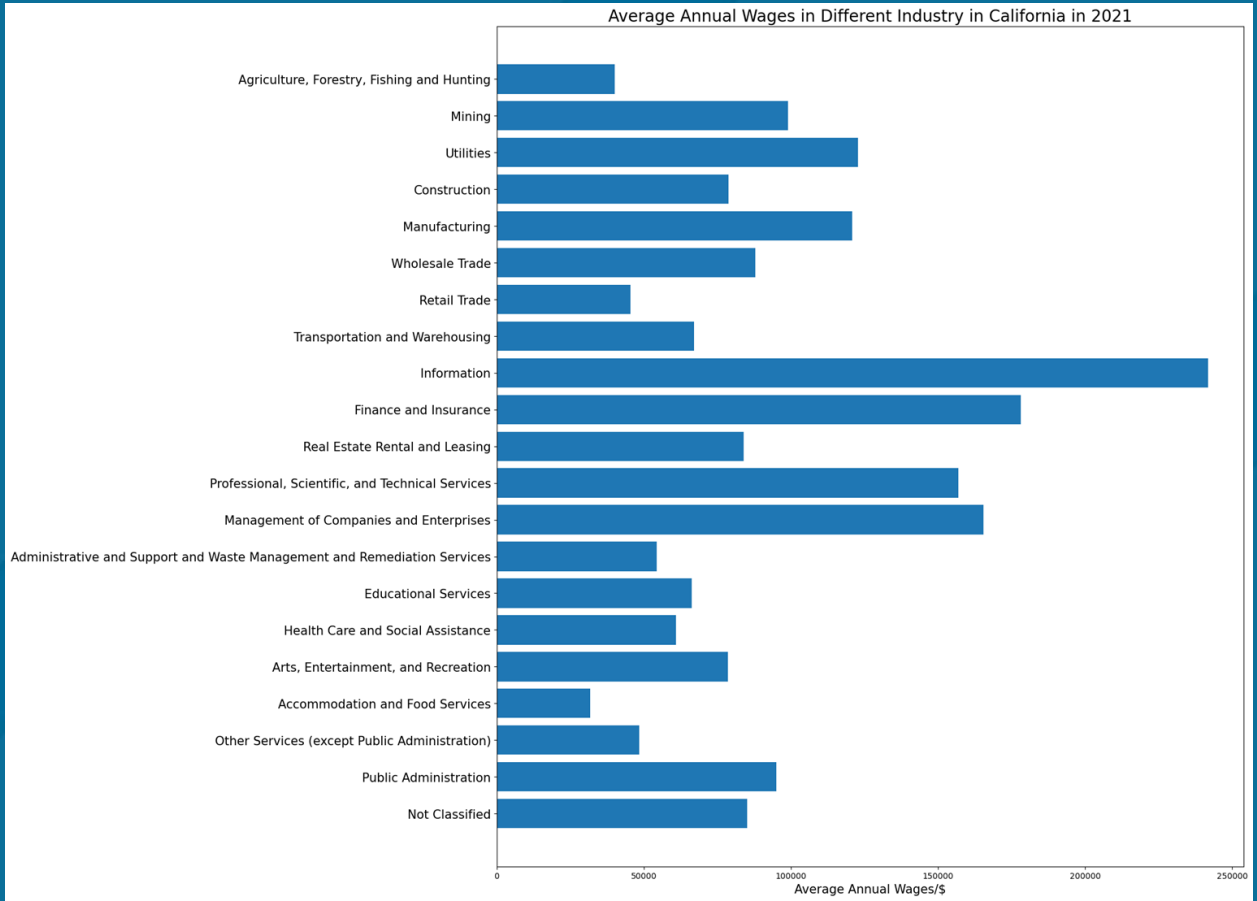
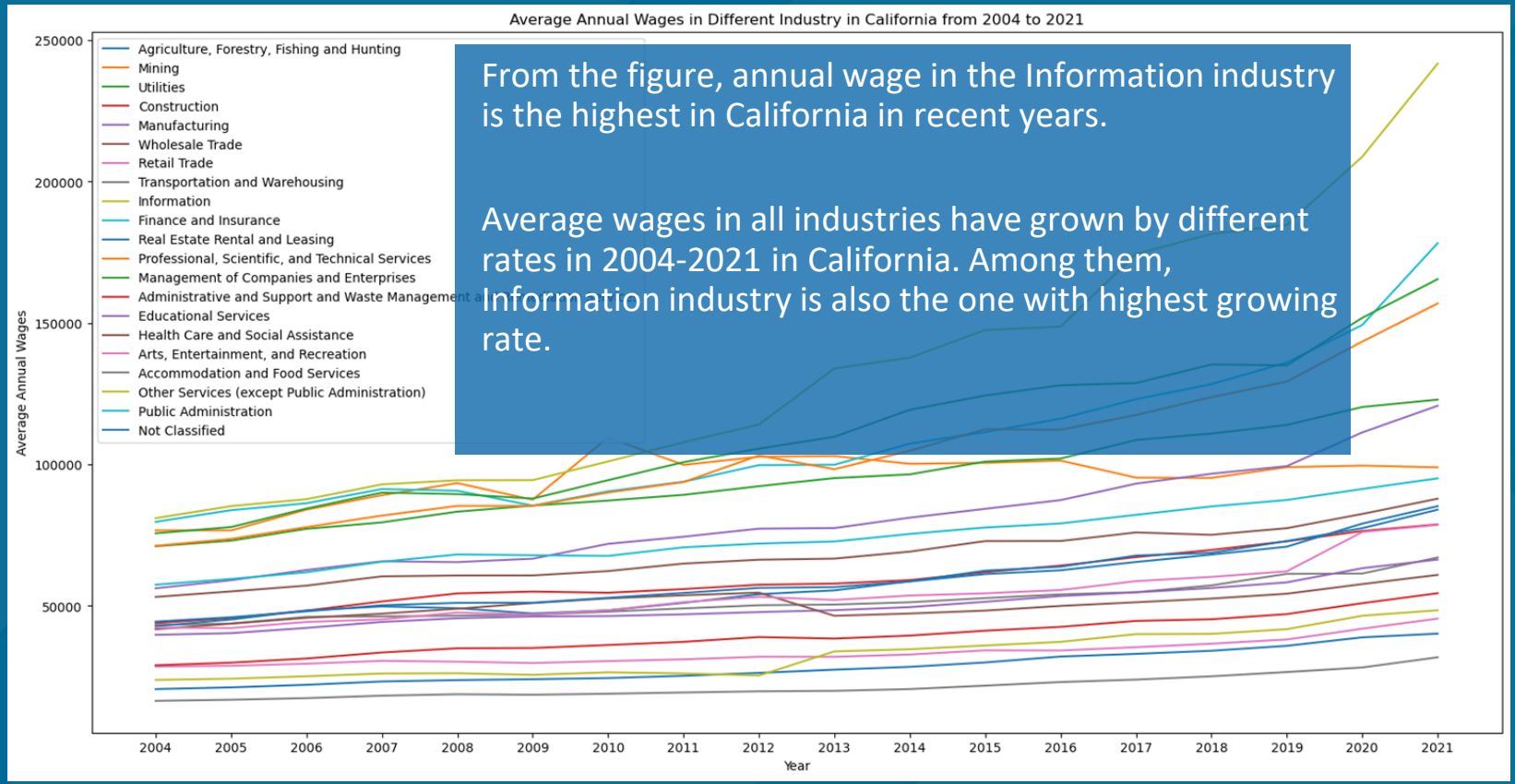
Industry Type

Average Annual Wages in Different Industry in California in 2021



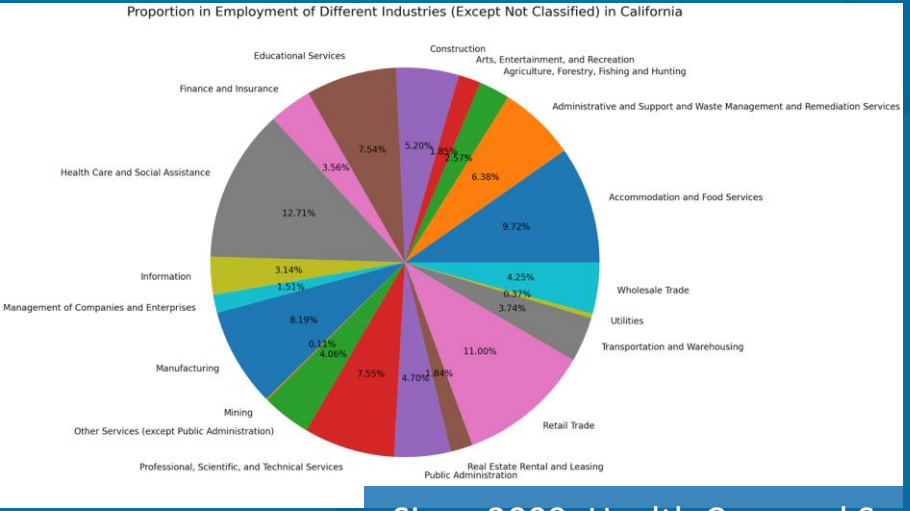
Average Annual Wages in Different Industry in California from 2004 to 2021

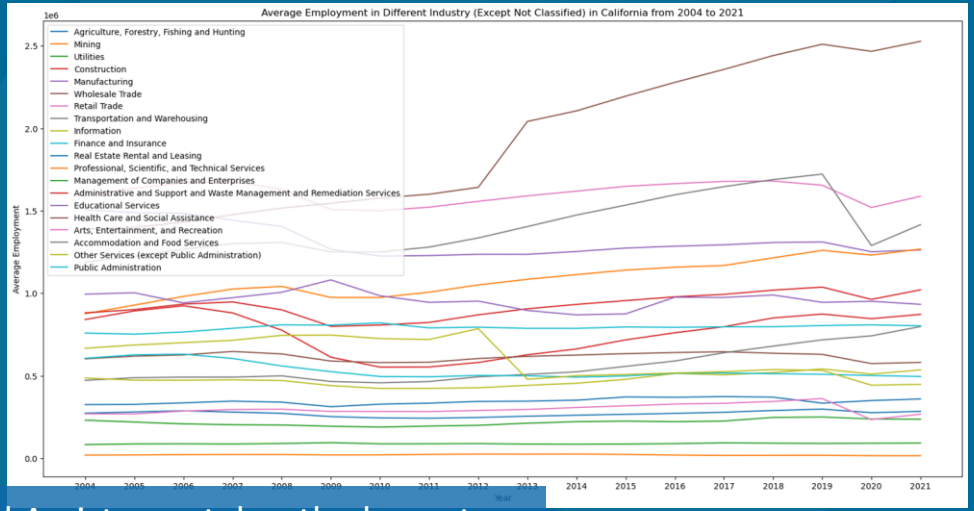


From the figure, annual wage in the Information industry is the highest in California in recent years.

Average wages in all industries have grown by different rates in 2004-2021 in California. Among them, Information industry is also the one with highest growing rate.

Employment of Different Industries





Since 2009, Health Care and Social Assistance takes the largest proportion of employment number. It's growing rate is also the highest.

In 2008 and 2020, most industries experienced marked declines, probably due to the economic crisis and epidemic respectively.

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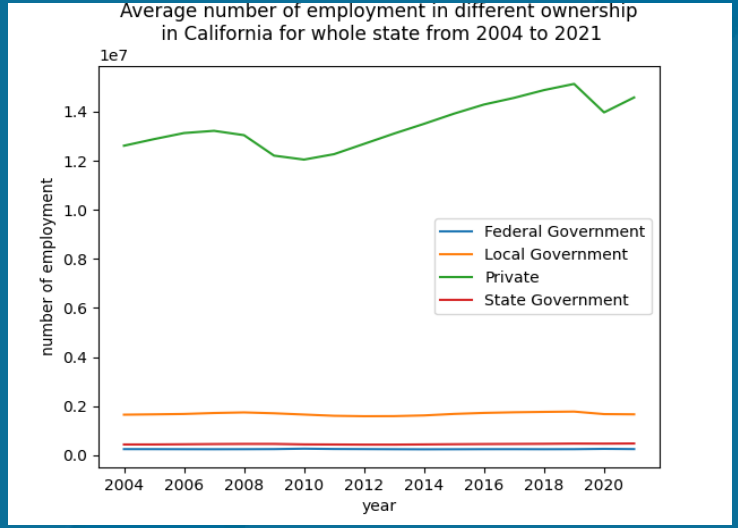
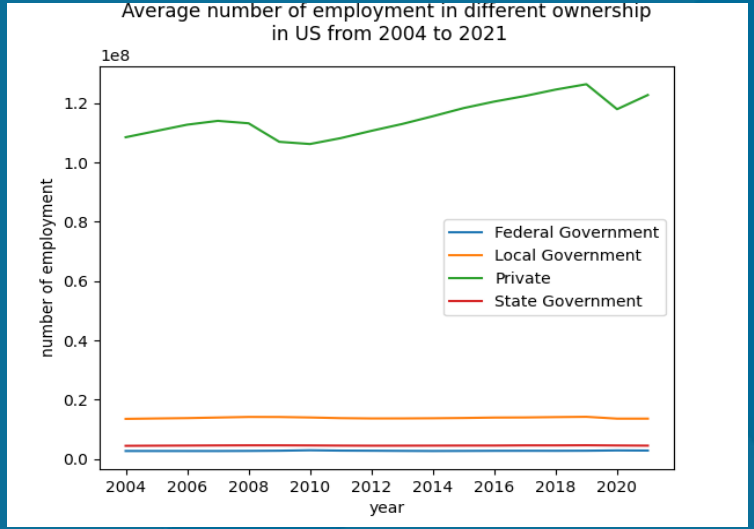
Ownership

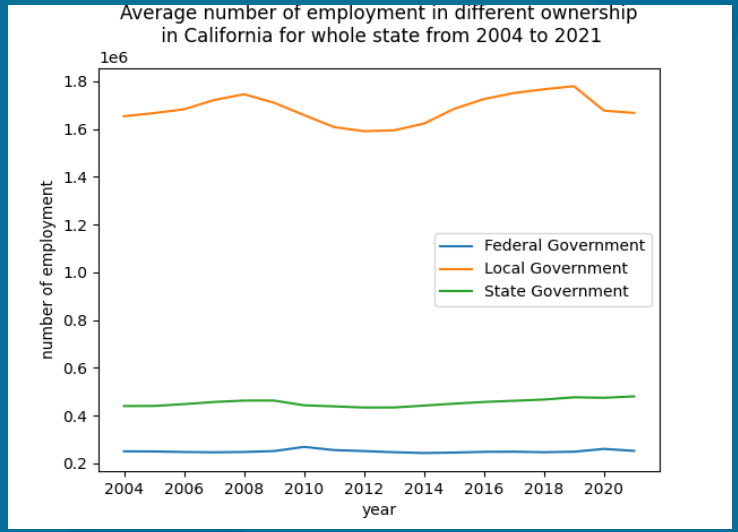
Number of employment with different ownership in California and the United States from 2004 to 2021

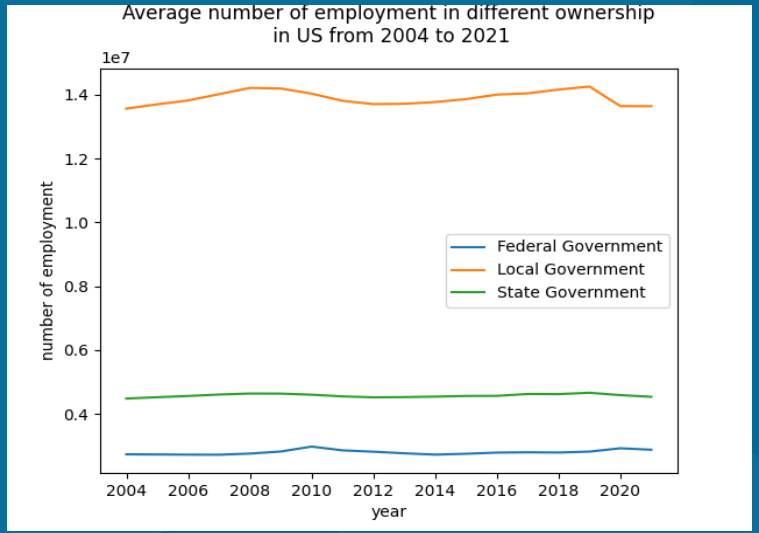




Private enterprises have the largest number of employees. We found that employment declined in 2008 and 2019. The reason is as the last student said.

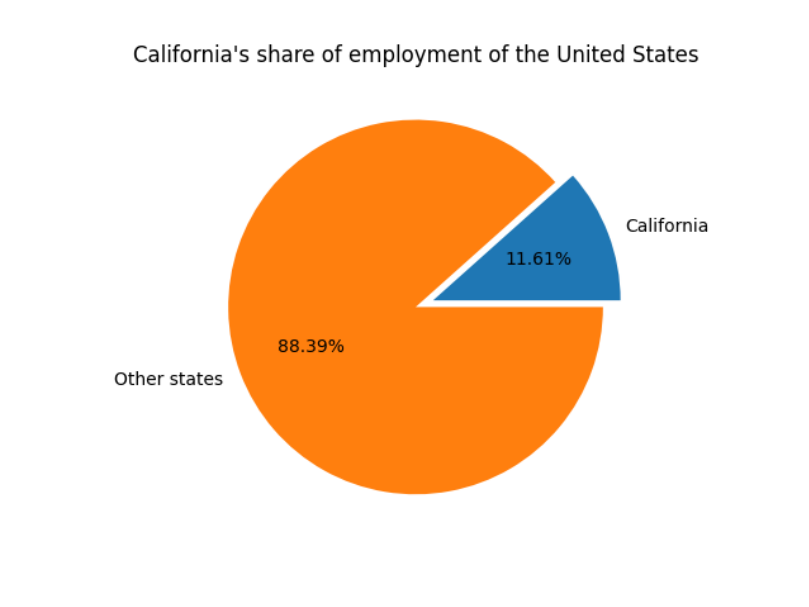
Number of employment with different ownership in California and the United States from 2004 to 2021





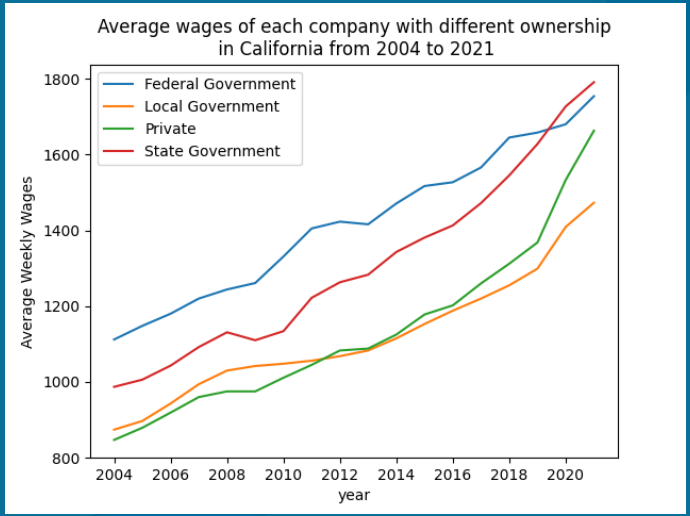
In comparison, the government is more stable. Although there is a certain decline, the overall employment remains stable.

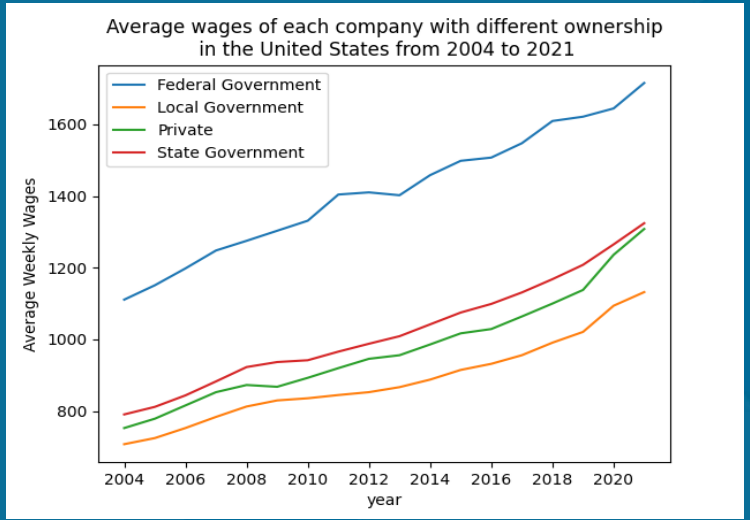
Number of employment with different ownership in California and the United States from 2004 to 2021



In general, California's employment accounts for more than 10% of the U.S., which sounds great.

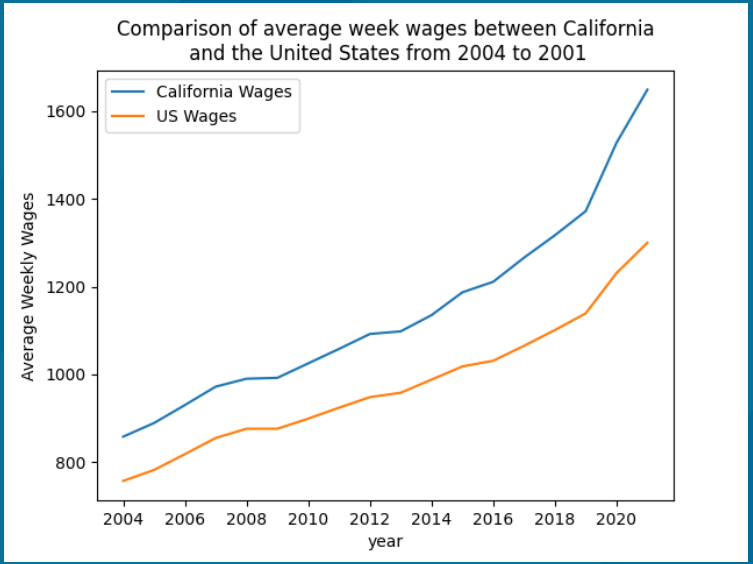
Average weekly wages of each company with different ownership in California and the United States from 2004 to 2021





We can also see that the salary of private ownership is growing rapidly. It may not be long before the private becomes the highest.

Average weekly wages of each company with different ownership in California and the United States from 2004 to 2021



It looks like that California's enterprises not only have more employees, but also their average wages are higher than the average of the whole United States. This is really a good thing!

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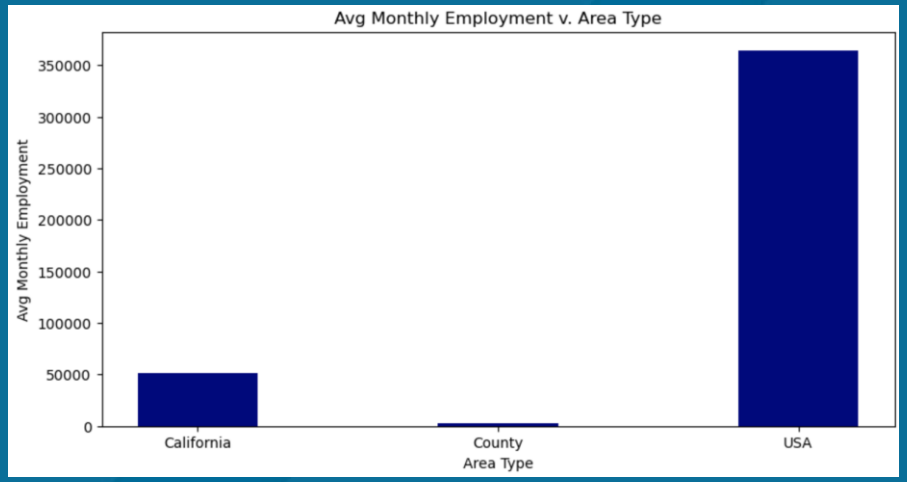
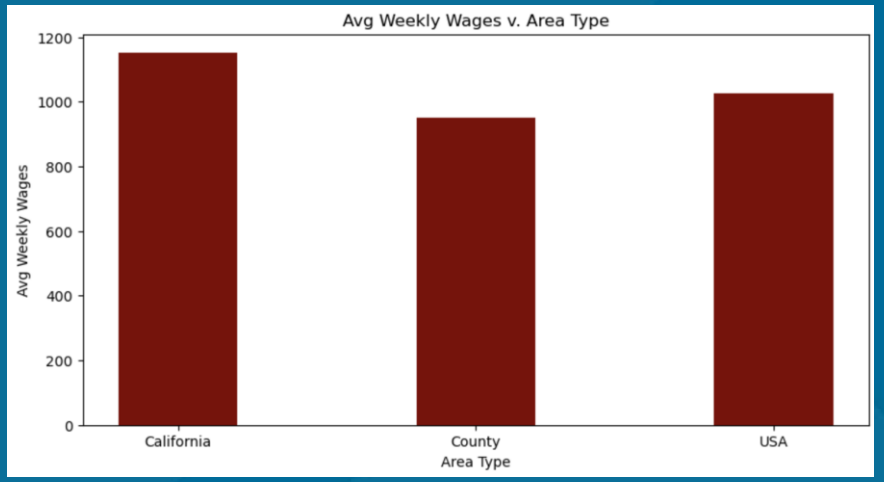
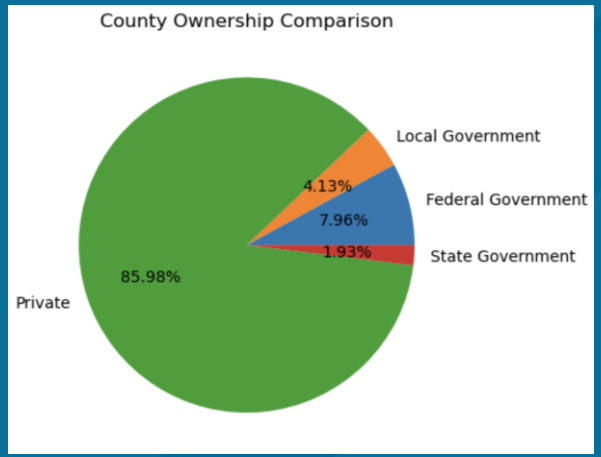
Area Type Comparison

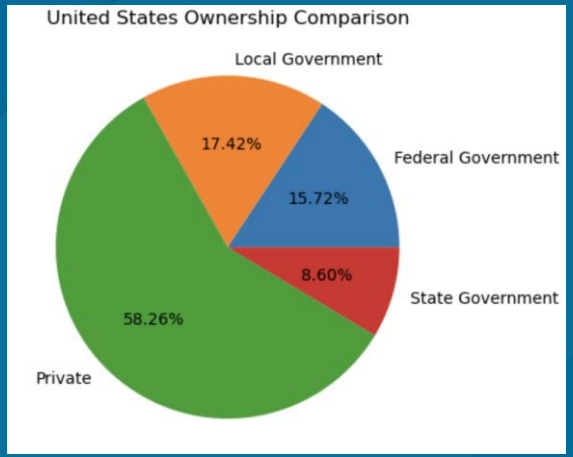
Avg Monthly Employment, Weekly Wages Based on Area Type (2004-2021)

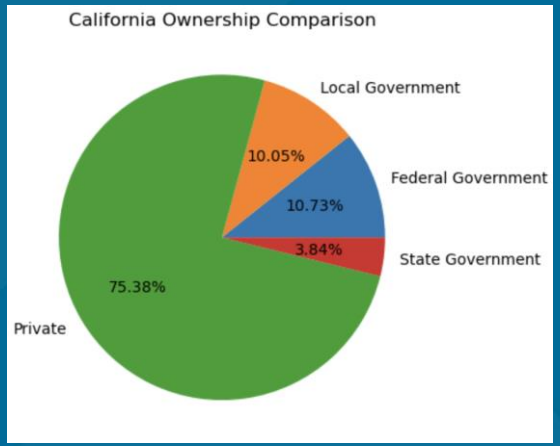




Average Ownership Based on Area Type from 2004 to 2021







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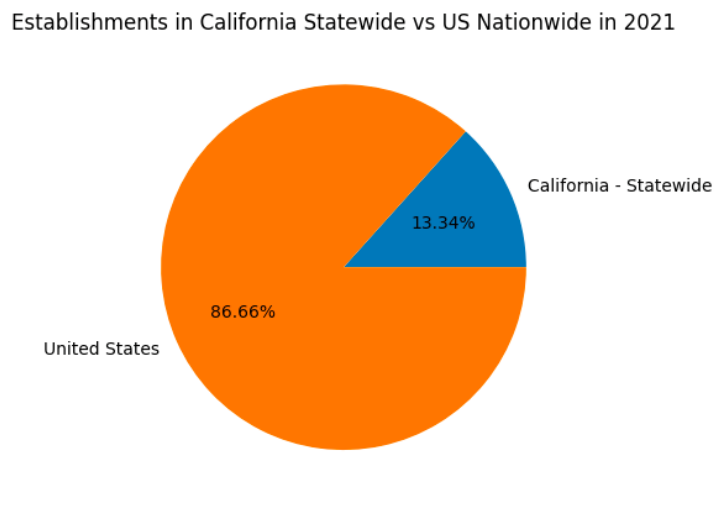
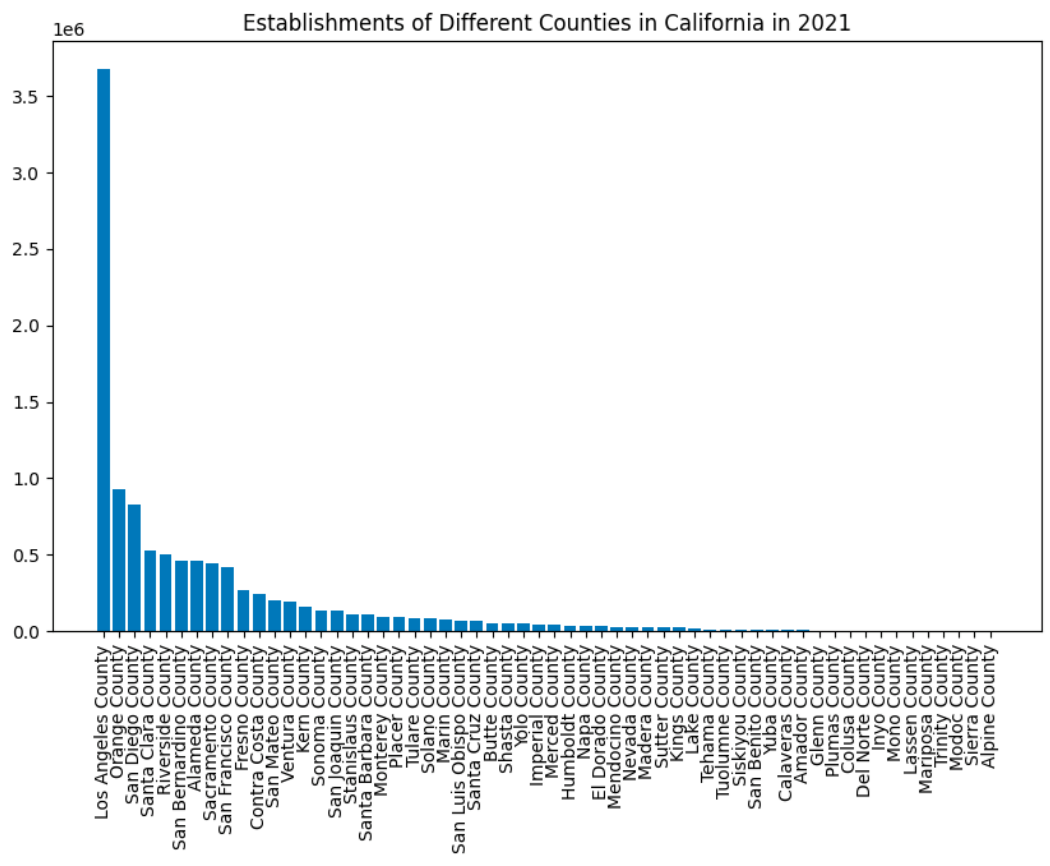
Establishments

Establishments in different areas

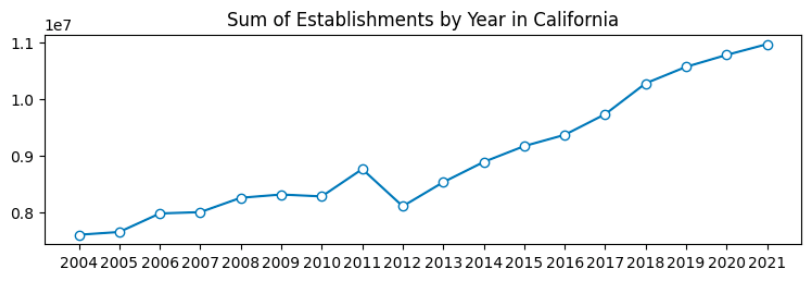


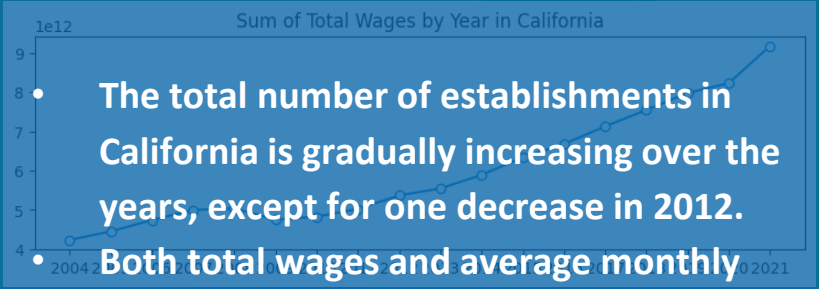
Focusing on the data in 2021.

- **The total number of establishments in California is about 1/7 of the total numbers in the US.**
- **In California different counties, Los Angeles has the highest number, which is 4 times bigger than the second largest number.**



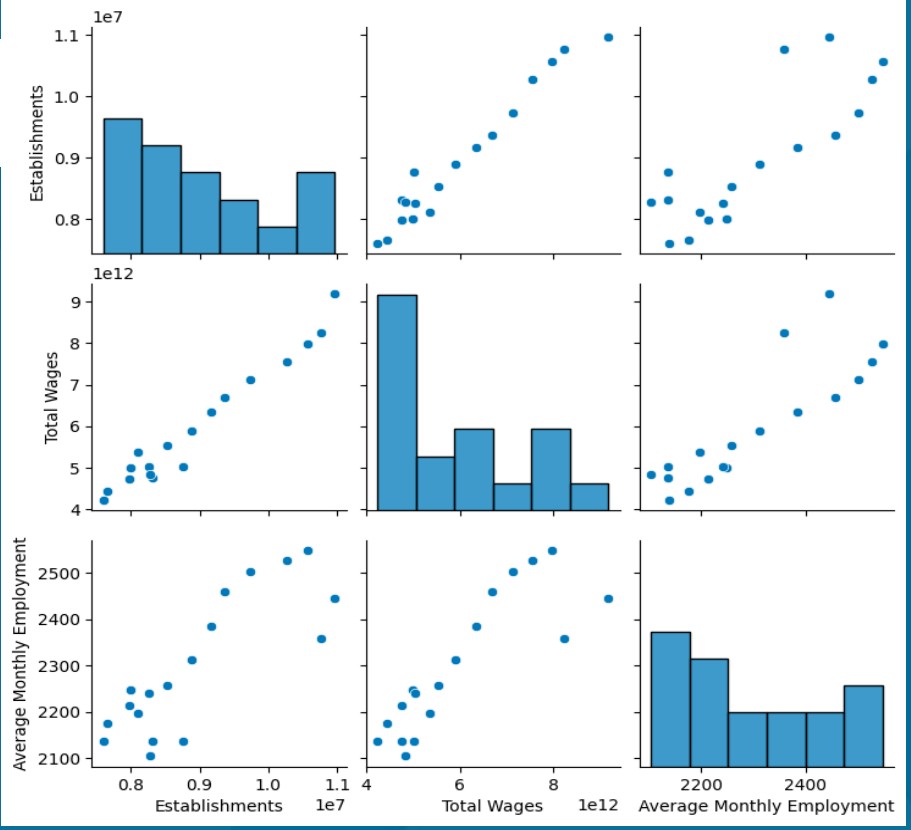
Correlations Analysis





- The total number of establishments in California is gradually increasing over the years, except for one decrease in 2012.
- Both total wages and average monthly employment has strong positive correlation with establishments.

And total wages has stronger correlation than average monthly employment.



Correlation	Establishments	Total Wages	Avg Monthly Employment
Establishments	1.000000	0.979327	0.829266
Total Wages	/	1.000000	0.859342
Avg Monthly Employment	/	/	1.000000

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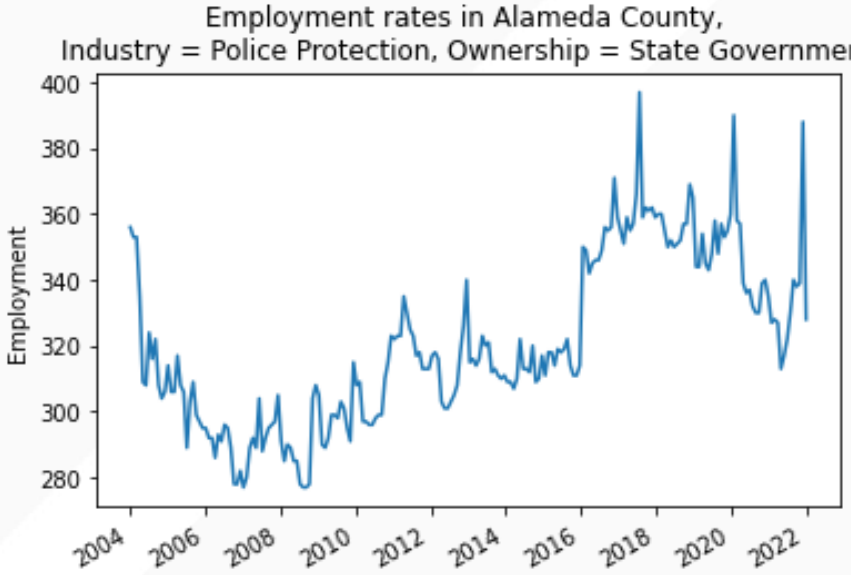
Time Series Analysis and prediction for Employment Data

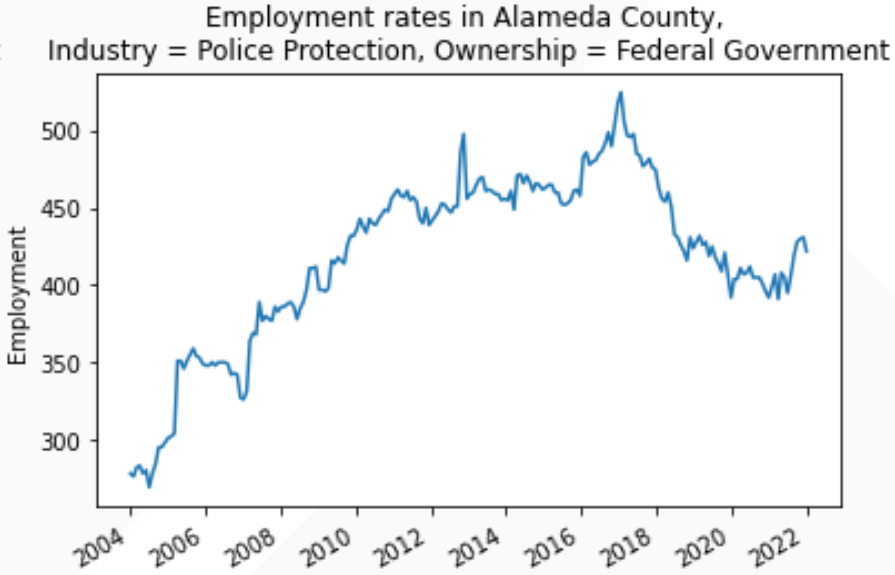
Alameda County

Time Series Analysis of Employment Data

Data overview:

- Time series data for employment numbers in each month from 2004 to the end of 2021.
- Data was extracted using the database management tool SQLite.





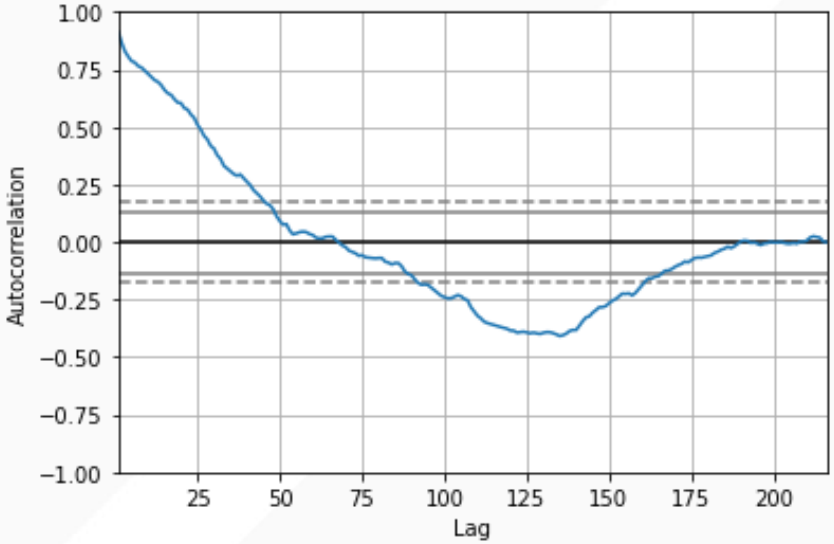
Time Series Analysis of Employment Data

Checking Stationarity, Trend and Seasonality using Statistical Tests

- Stationary: Constant Mean and Variance at each time interval.
- Augmented Dickey-Fuller Test:
  - Null Hypothesis: H0: The time series is non-stationary.
  - P - value of Data 1: 0.14. (>0.05) => Non-Stationary
- Mann Kendall Trend Test:
  - Null Hypothesis: H0: The time series has no trend.
  - P - value of Data 1: 0 (<0.05) => The series has a trend.
  - Found to have an overall positive trend.

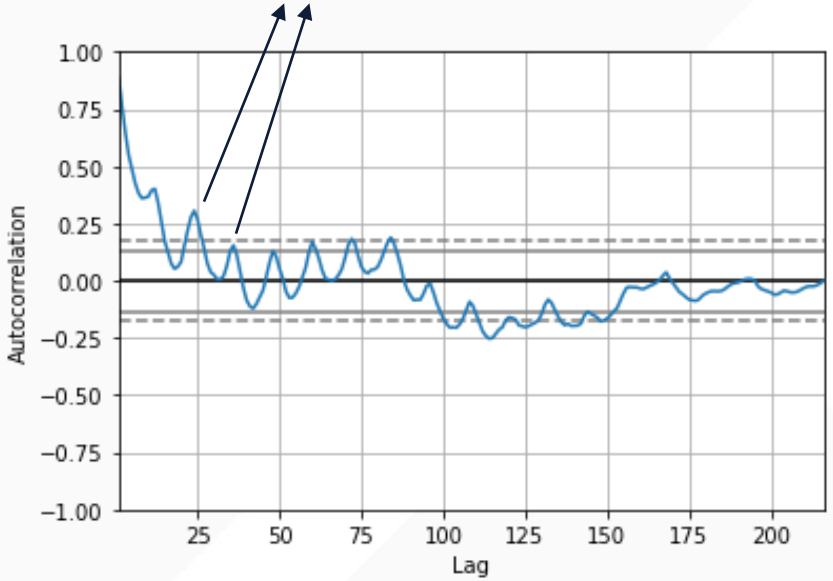
Time Series Analysis of Employment Data

Detection of Seasonality using Autocorrelation



Industry: Police Protection

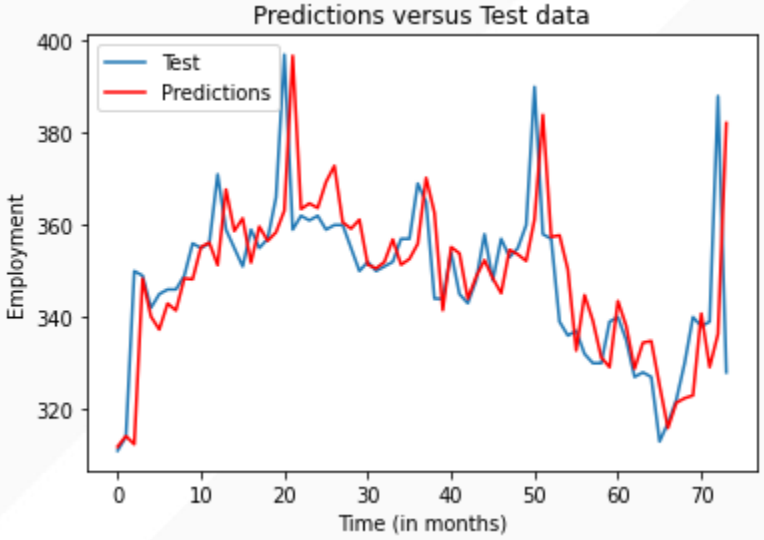
There are peaks in the plot at 12,24,36….



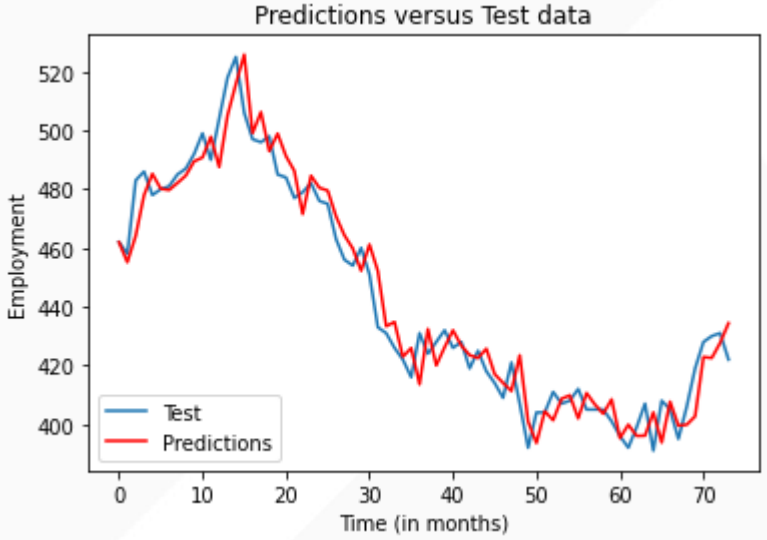
Industry: Nursery, Garden & Farm Supply Stores

Time Series Prediction of Employment Data using ARIMA

- ARIMA(p,d,q): Autoregressive Integrated Moving Average Model
- P -> Number of lag observations to include =25, found from the autocorrelation plot



Police Protection (State Govt.), RMSE = 14.23



Police Protection (Federal Govt.), RMSE = 8.703

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Conclusions: Key Takeaways

- Major industry types in California are Information and Health Care and Social Assistance.
- Although private enterprises have the most employment. The government is more stable than the private ownership, Especially when encountering some crises.
- Total wages and average monthly employment both have strong positive correlation with establishments. And total wages has stronger correlation than average monthly employment.
- California's employment accounts for over 10% of the United States'
    - Has higher average wages than the entire U.S.

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