

# **HR Dataset Analysis**

## **DEPI**

Team Members:

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## Environment Preparation

- We Started with loading necessary Libraries
- Then the datasets have been loaded

## Data Exploration

We started to explore data using (`info()`, `describe()`, `shape()`, `head()`, `unique()`), we noticed that:

- **PerformanceRating** Data Frame has more than one Rate for the same Employee but in different dates.
- **EducationLevel**, **RatingLevel**, **SatisfiedLevel** data frames contains encoding of the Categorical information
- **Education** Column in **employees** data frame has different name in **EducationLevel** data frame >>> **EducationLevelID**
- **EducationField** Column contains **Marketing** twice but one of them with extra Space >>> **"Marketing "**

## Data Cleaning

- We renamed **EducationLevelID** Column in **EducationLevel** data into **Education**.
- We used **Education** column to merge **employees** data frame with **EducationLevel** data frame into a new data frame named **emp\_merge**.
- Again, we merged **emp\_merge** data frame with **PerformanceLevel** data frame into a new data frame named **HR\_ratings**.
- We Created 2 dynamic dictionaries named **Rating\_dict** and **Satisfied\_dict**.
- We used **Rating\_dict** dictionary to map **SelfRating** and **ManagerRating** into a new columns.
- We used **Satisfied\_dict** dictionary to map **EnvironmentSatisfaction**, **JobSatisfaction** and **RelationshipSatisfaction** into a new columns.
- We dropped unnecessary Columns from **Emp\_merge** data frame which is:
  - **FirstName**

- LastName
  - Education
  - StockOptionLevel
  - HireDate
- We dropped unnecessary Columns from HR data frame which is:
  - FirstName
  - LastName
  - Full Name
  - Education
  - StockOptionLevel
  - HireDate
  - ReviewDate
  - SelfRating
  - ManagerRating
  
- We created `fix_Markiting()` Function to remove the Extra Space from "Marketing".

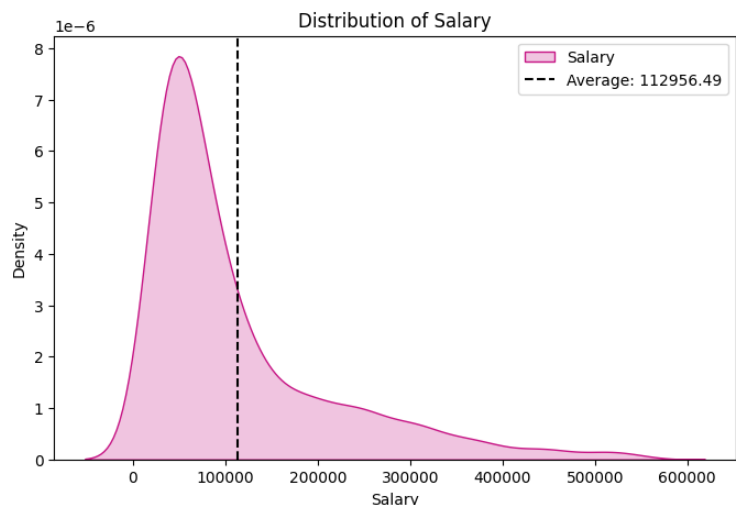
## Analysis Questions

1. What is the attrition rate across different age groups?

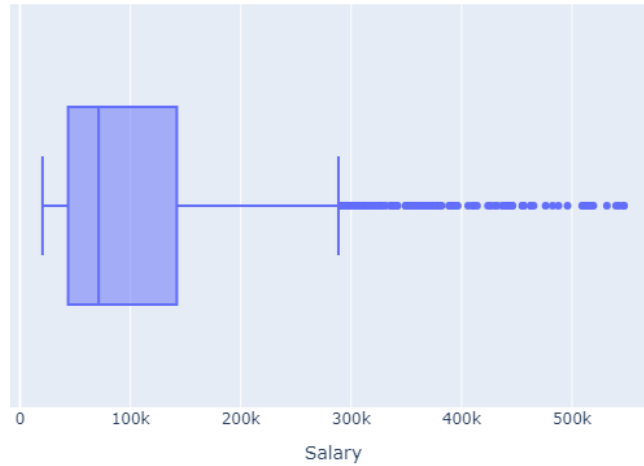
2. How does Salary affect attrition?
3. How does distance from home affect attrition?
4. Does education level affect attrition?
5. Does gender play a role in employee attrition?
6. How does business travel frequency impact attrition?
7. Which department has the highest attrition rate?
8. How does job satisfaction affect attrition?
9. How does Environment Satisfaction affect attrition?
10. How does Relationship Satisfaction affect attrition?
11. How does Work Life Balance affect attrition?
12. How does overtime impact attrition?
13. How does Training Times Last Year influence Attrition?
14. Does marital status impact attrition?
15. How Does Job role impact attrition?
16. Does Education Field impact attrition?
17. Does years since last Promotion play a role in attrition?
18. What is the relation between the employees BusinessTravel and their job satisfaction level?
19. What is the percentage of different satisfaction levels among employees?
20. What is the percentage of different Work Life Balance levels among employees?
21. What is the relation between self-rating and manager rating?
22. What is the relation between attrition and years with current managers?
23. How does the stockoption Level affect attrition?

## Data Analysis & Insights

- From Salary Distribution we can find that, Average Salary is **112.956K**.

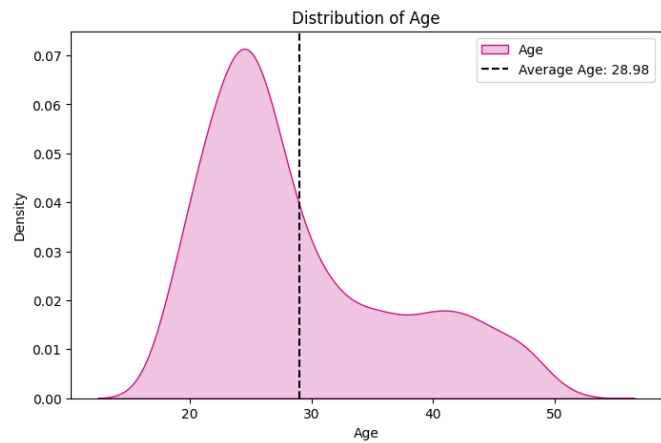


- From Salary Pox Plot, it's clear that, majority of employees earn below the average salary.



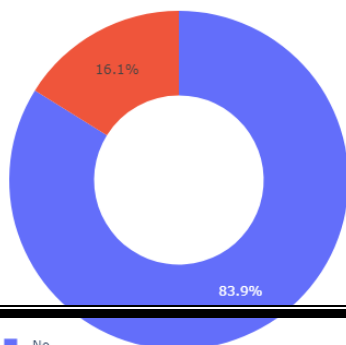
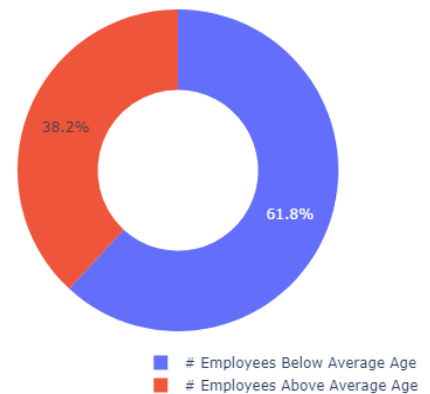
- Average Age is **29.98** Years

- From Age Distribution, it's clear that, majority of employees' age below the average Age.



- Pie Charts Shows the Percentage of Employees Relative to Average Age.

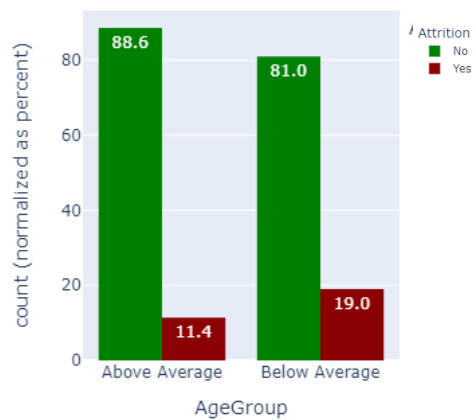
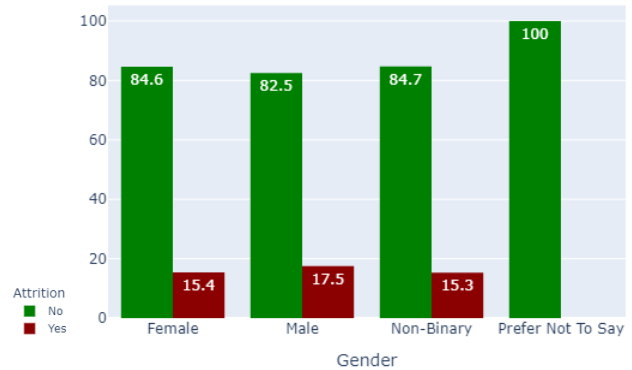
- **909** Employees from **1470** Below Average Age.



■ No  
■ Yes

- Pie Charts Shows the Percentage of Employees That Attire.
- 237 Employees from 1470 Attire.

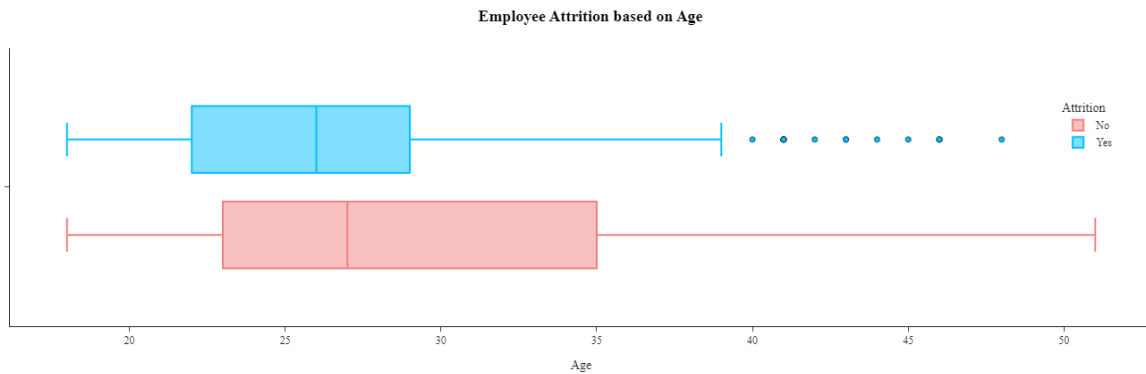
- Par Chats Shows the Percentage of Attrition in Different Genders.
- Percentage is almost the same among different genders.



- Par Chats Shows the Percentage of Attrition Based on AgeGroup.
- Employees with Below Average Age have higher Attrition Rate 19%

- Pox Plot Shows Attrition based on Age.

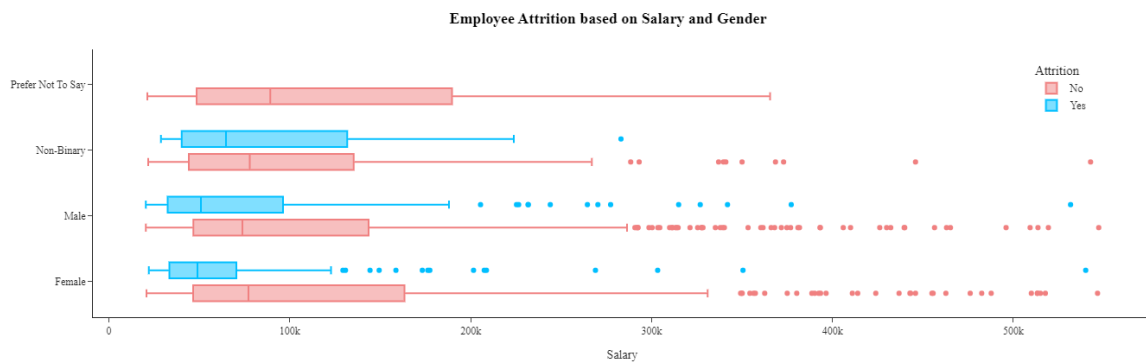
- Younger Employees have a High Attrition rate.



- Pox Plot Shows Attrition based on salary
- Most of Employees that Attrite Have Low Salary Range



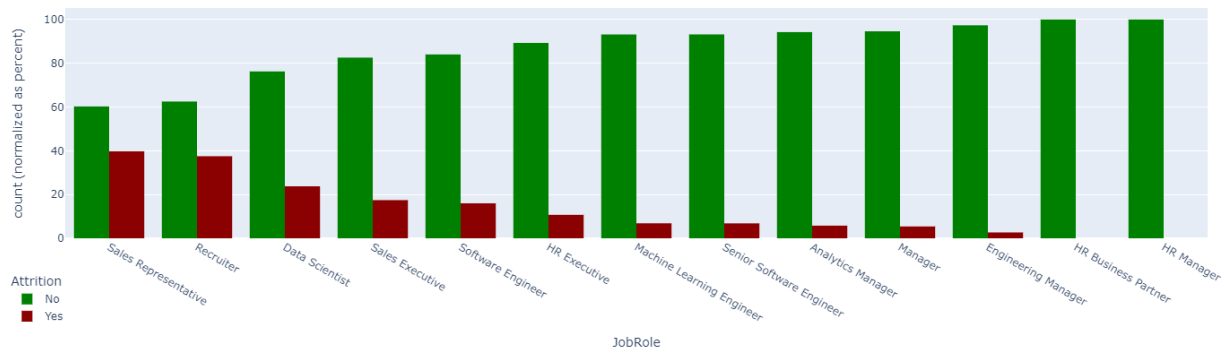
- Pie Chart Shows Attrition based on salary and gender
- The Most Affected Gender by low Salary is Female, they tend to Attrite.



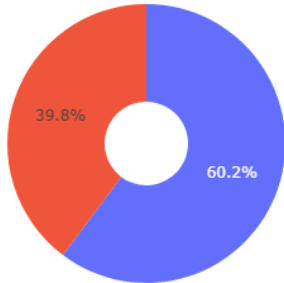
- Par chart shows percentage of Attrition in different Job Roles

- Following Job Roles have the Highest Attrition Rate:

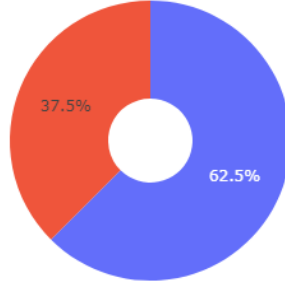
1. Sales Representative
2. Recruiter
3. Data Scientist
4. Sales Executive
5. Software Engineer



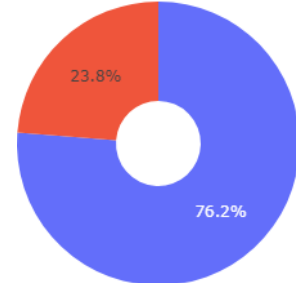
- Following Pie Charts Shows the Percentage of Attrition in the Top Five Job Roles.



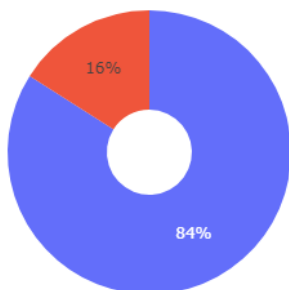
Sales Representative



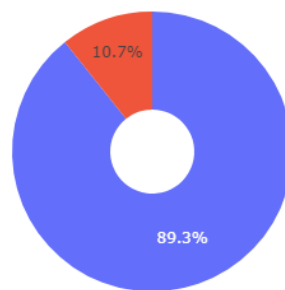
Recruiter



Data Scientist



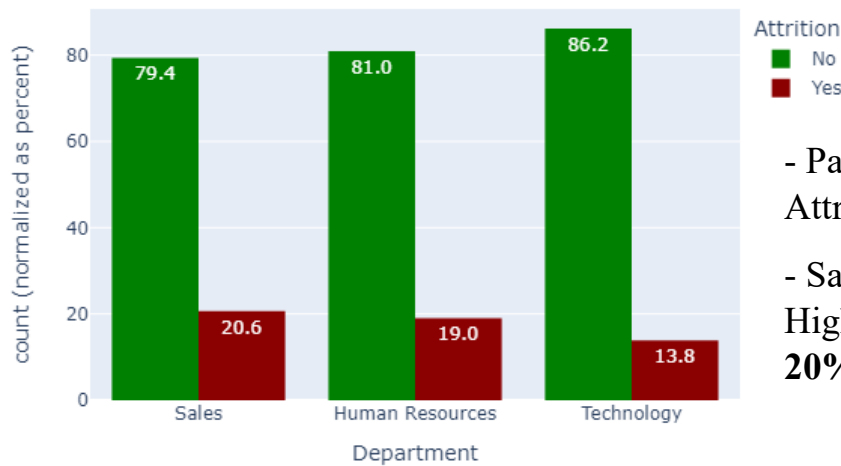
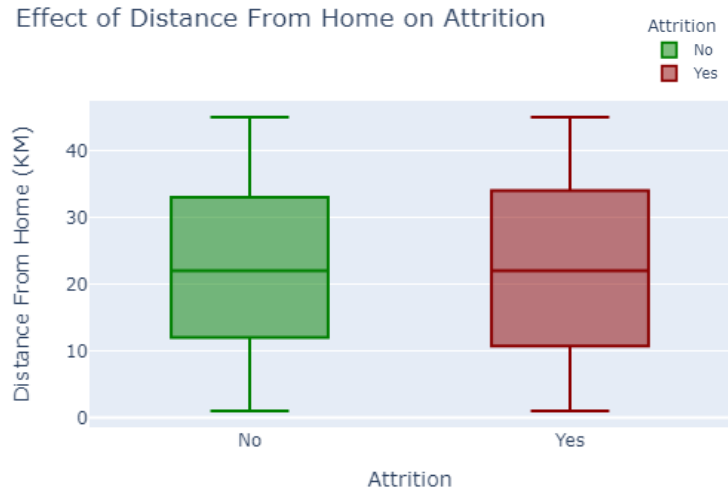
Sales Executive



Software Engineer



- Pox Plot doesn't Shows a difference between Employees who leave the Company and others who don't, based on Distance from Home.

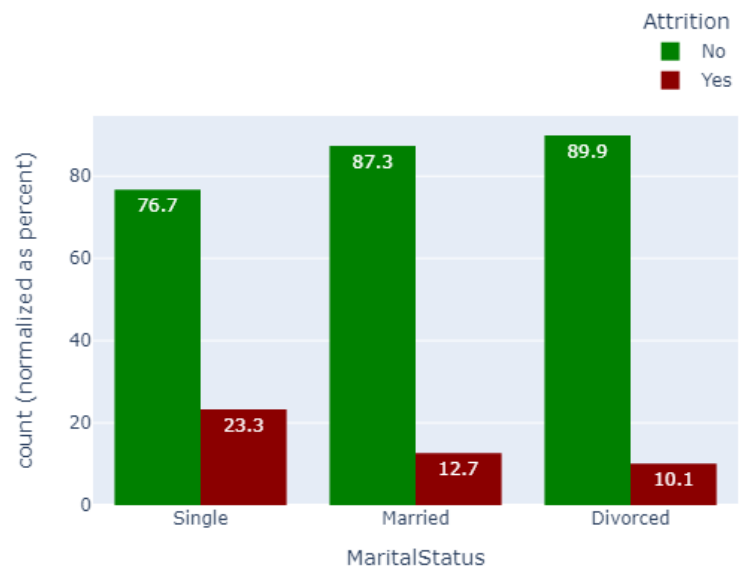


- Bar Chart Shows Percentage of Attrition in different Departments

- Sales Department Has the Highest Attrition Percentage of 20%

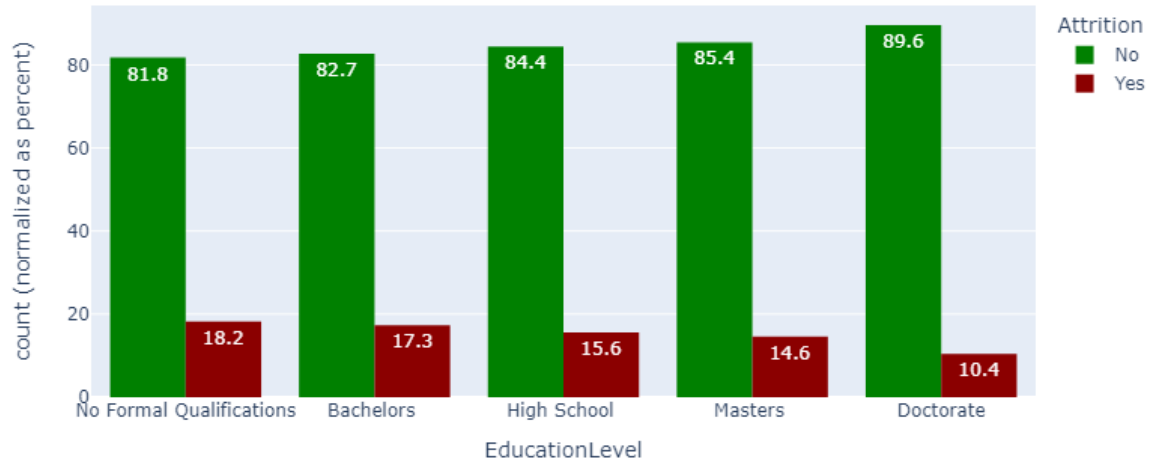
- Bar Chart Shows Percentage of Attrition in different Marital Status

- Single Employees Have the Highest Attrition Percentage of 23.3%



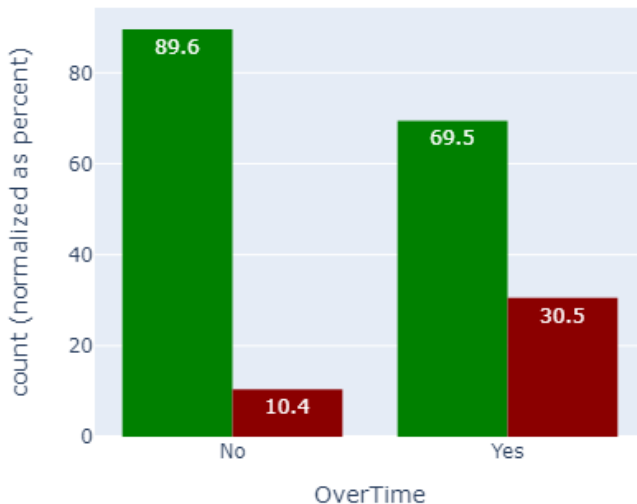
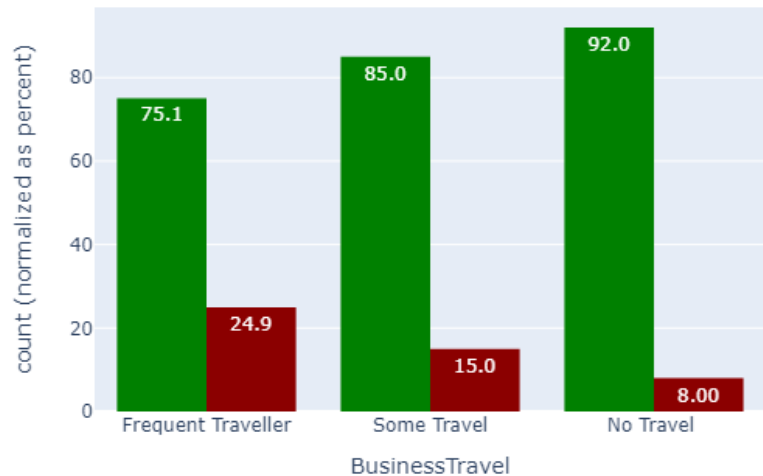
- The Par Chart Shows Percentage of Attrition in different Educational Levels.

- Higher Educational level (Master, Doctorate) has low attrition rate.



- The Par Chart Shows Percentage of Attrition in different Business Travel Status?

- Frequent travelers have the highest attrition Rate.

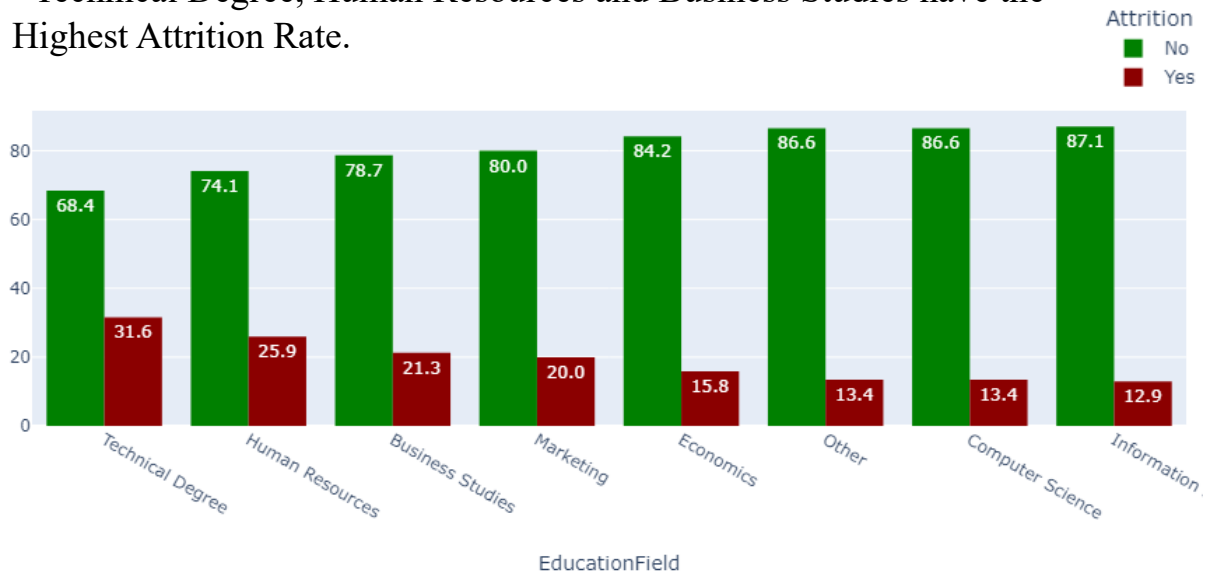


- Par Chart Shows Overtime Effect on Attrition

- **30.5%** of Employees Who have overtime tend to Attrite, which is High Percentage Comparing to Employees Who don't have overtime.

- The Bar Chart Shows Percentage of Attrition in different Educational Fields.

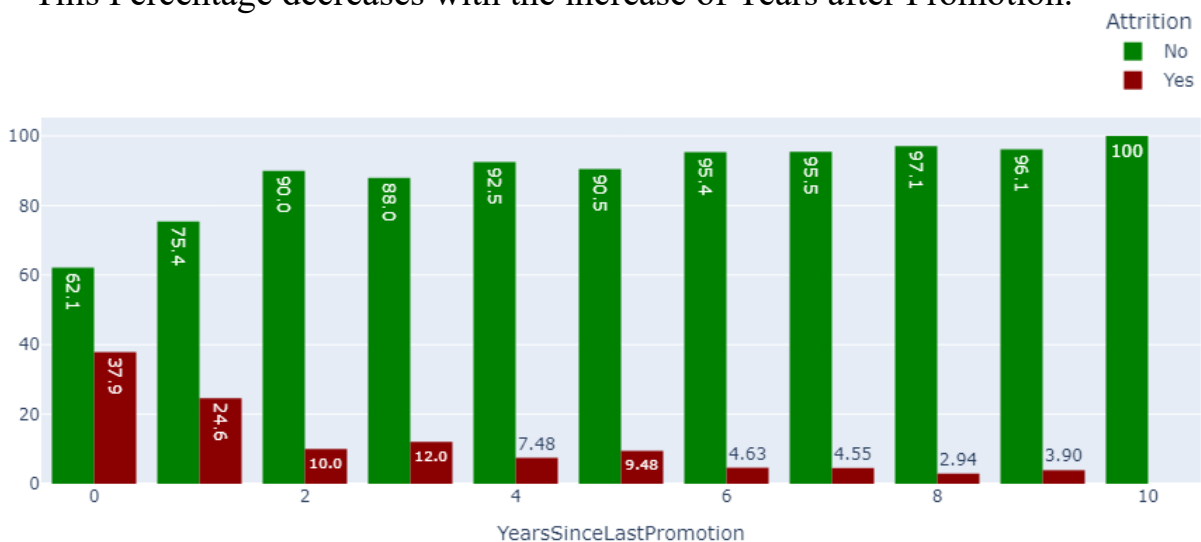
- Technical Degree, Human Resources and Business Studies have the Highest Attrition Rate.



- The Bar Chart Shows How Years Since Last Promotion impact attrition.

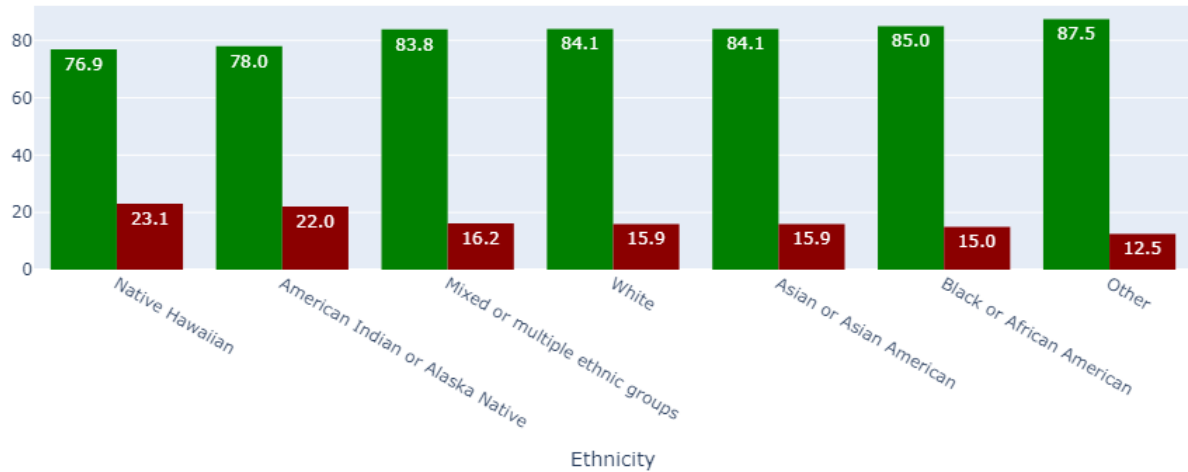
- **37.9%** of Employees Leaves the Company Directly After Promotion.

- This Percentage decreases with the increase of Years after Promotion.



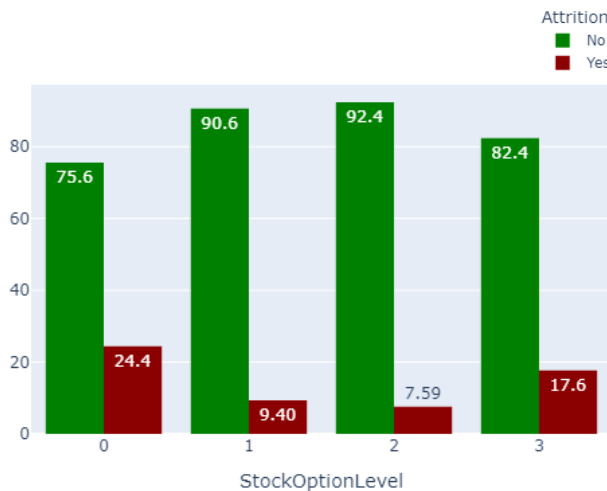
- Most ethnic groups have the same attrition percentage of about 15% except for:

- Native Hawaiians with attrition percentage of **23%**.
- American Indians or Alaska native with attrition percentage of **22%**.



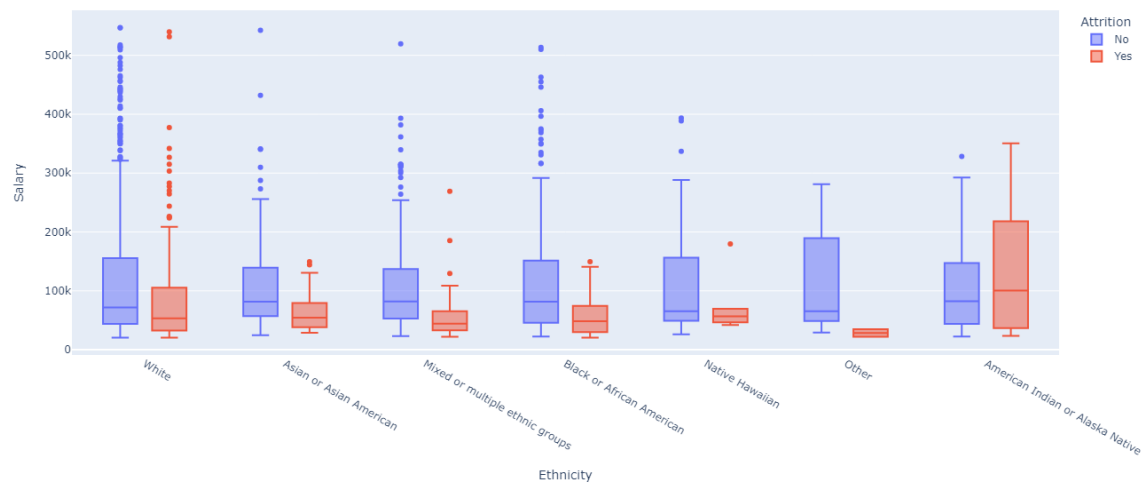
- Par Chart Shows Attrition percentage in different States.

- CA has the highest attrition of **17.48%**.



- Par Chart Shows How Different Stock Option Levels Affect Attrition

- Level 0 Stock has the highest attrition of **24.4%**.



- The Spread in **American Indian Alaska Native** Pox Bolt shows that they tend to Attrite even though they have highest range of Salary

## Conclusion

- Younger employees (below average age) tend to have a higher attrition rate.
- Lower salaries are associated with higher attrition rates.
- The average salary is \$112,956.
- Distance from home does not show a significant difference in attrition rates.
- Higher education levels (Master's, Doctorate) are associated with lower attrition rates.
- Males have the highest attrition rate.
- 30.5% of employees who work overtime tend to leave the company.
- Sales and Human Resources departments have relatively high attrition rates.
- More frequent business travel is associated with higher attrition rates.
- Sales Representatives, Recruiters, Data Scientists, Sales Executives, and Software Engineers have the highest attrition rates.
- Single employees have the highest attrition rate (23.3%).
- Many employees leave before having a chance for promotion.
- The stock option level does not significantly affect attrition.
- Ethnicity: Native Hawaiian and American Indian/Alaska Native employees have the highest attrition rates.
- State: California has the highest attrition rate.
- Training: The number of training opportunities taken within a year influences attrition.