

HR Performance Management

Report

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About Us

INX Future Inc.

INX Future Inc. (referred to as INX) is a **leading provider of data analytics and automation solutions**, with over **15 years of global business presence**.

The company has consistently been recognized as one of the **Top 20 Best Employers** for the past **five consecutive years**, highlighting its strong employer brand and attractive working environment.





Current Challenges – Declining Employee Performance

- In recent years, employee performance indexes have shown a downward trend, raising serious concerns among top management.
- CEO Mr. Brain acknowledges the issue but is reluctant to take disciplinary actions against underperforming employees, fearing it may negatively impact overall employee morale and further reduce productivity.

Data Understanding

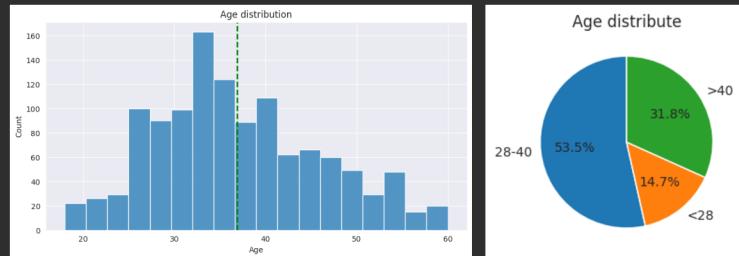
The data collected included **1200 employee's performance appraisal records, described by 28 parameters.**

- 1. EmpNumber:** Unique employee ID.
- 2. Age:** Employee's age in years.
- 3. Gender:** Employee's gender [Male/Female].
- 4. EducationBackground:** High school or post-secondary degree.
- 5. MaritalStatus:** Marital or civil status.
- 6. EmpDepartment:** Employee's department.
- 7. EmpJobRole:** Main job role/responsibility.
- 8. BusinessTravelFrequency:** Frequency of business travel.
- 9. DistanceFromHome:** Distance from home to office.
- 10. EmpEducationLevel:** Education level (e.g., Diploma, Degree, Master's).
- 11. EmpEnvironmentSatisfaction:** Satisfaction with work environment.
- 12. EmpHourlyRate:** Pay rate per hour.
- 13. EmpJobInvolvement:** Level of job involvement.
- 14. EmpJobLevel:** Job grade or level.
- 15. EmpJobSatisfaction:** Job satisfaction level.
- 16. NumCompaniesWorked:** Number of previous companies worked at.
- 17. OverTime:** Works overtime or not [Yes/No].
- 18. EmpLastSalaryHikePercent:** Last year's salary increase percentage.
- 19. EmpRelationshipSatisfaction:** Satisfaction with workplace relationships.
- 20. TotalWorkExperienceInYears:** Total years of work experience.
- 21. TrainingTimesLastYear:** Number of trainings last year.
- 22. EmpWorkLifeBalance:** Balance between work and personal life.
- 23. ExperienceYearsAtThisCompany:** Years at current company.
- 24. ExperienceYearsInCurrentRole:** Years in current job role.
- 25. YearsSinceLastPromotion:** Years since last promotion.
- 26. YearsWithCurrManager:** Years with current manager.
- 27. Attrition:** Whether the employee left the company.
- 28. PerformanceRating:** Overall performance rating.

Basic Analysis

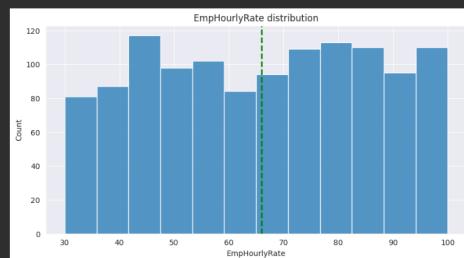
1. Age

- Age distribute range is between 18 to 60
- Most of the employee age is between 28 to 40 (~53%)



2. Employee Hourly Rate

- Employee hourly rate distribute range is between \$30 to \$100
- Most of the employee hourly rate is between \$45



3. Year Experience

- The majority of the company is in the range of less than 10 years of experience.
- The number of people with experience from 0 to about 12 years is very high, then gradually decreases.

Most common group (~11 years):

- There is a prominent column around 11 years of experience — this is the highest point (mode), which shows the group with the highest number of employees.

There are many outliers with high experience (>30 years):

- Some people have up to 35–40 years of experience, but very few — indicating that these are special cases (outliers).

4. Experience Years At This Company

- Most employees have less than 10 years working at the company.
- In particular, the highest column is in the range of 4–5 years, indicating that this is the most common number of years of work.

There are many new employees (0–3 years):

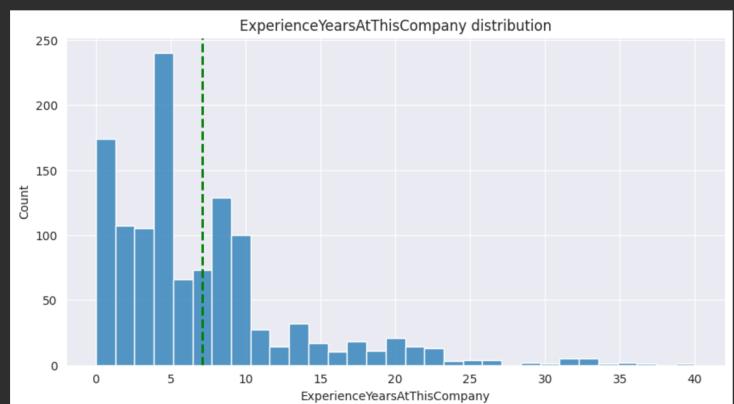
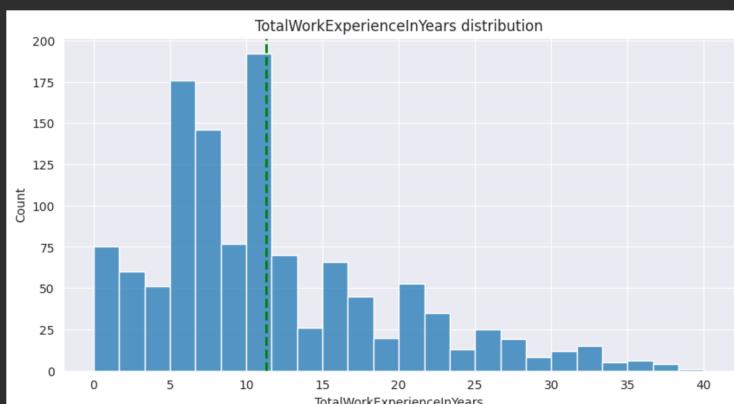
- A large number of employees have only worked from 0 to 3 years ⇒ The company may be in the expansion phase

A small number of long-term employees:

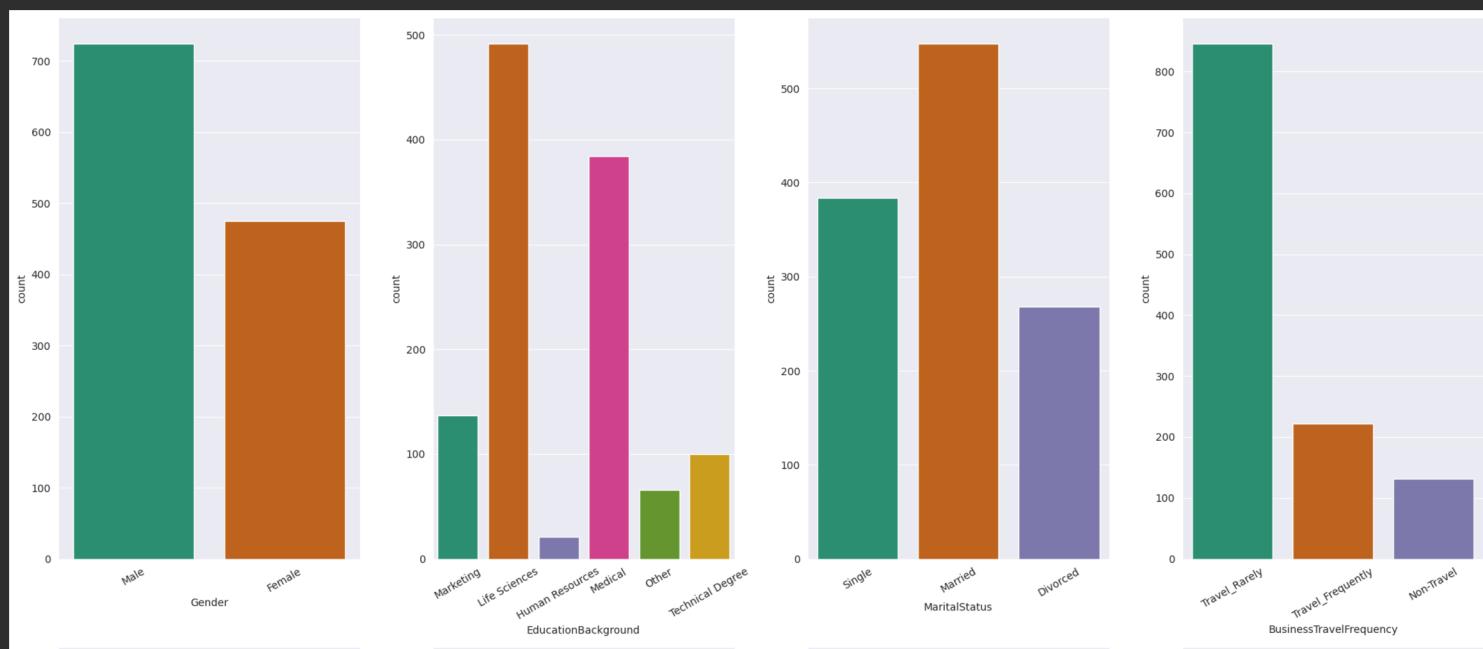
- There is still a small number of employees working >20 years, even 30–40 years ⇒ They may be senior, veteran employees.

Green dashed line:

- It may be the average number of years working at the company, around 7 years.
- This average is skewed up due to some outliers with very long working years.



Basic Analysis



5. Gender

- The number of male employees is higher than that of female employees.
- The workforce is predominantly male.

6. Education Background

- The most common backgrounds are Life Sciences and Medical.
- Human Resources has the fewest employees.
- This suggests the company has a focus on Life Sciences and Medical roles.

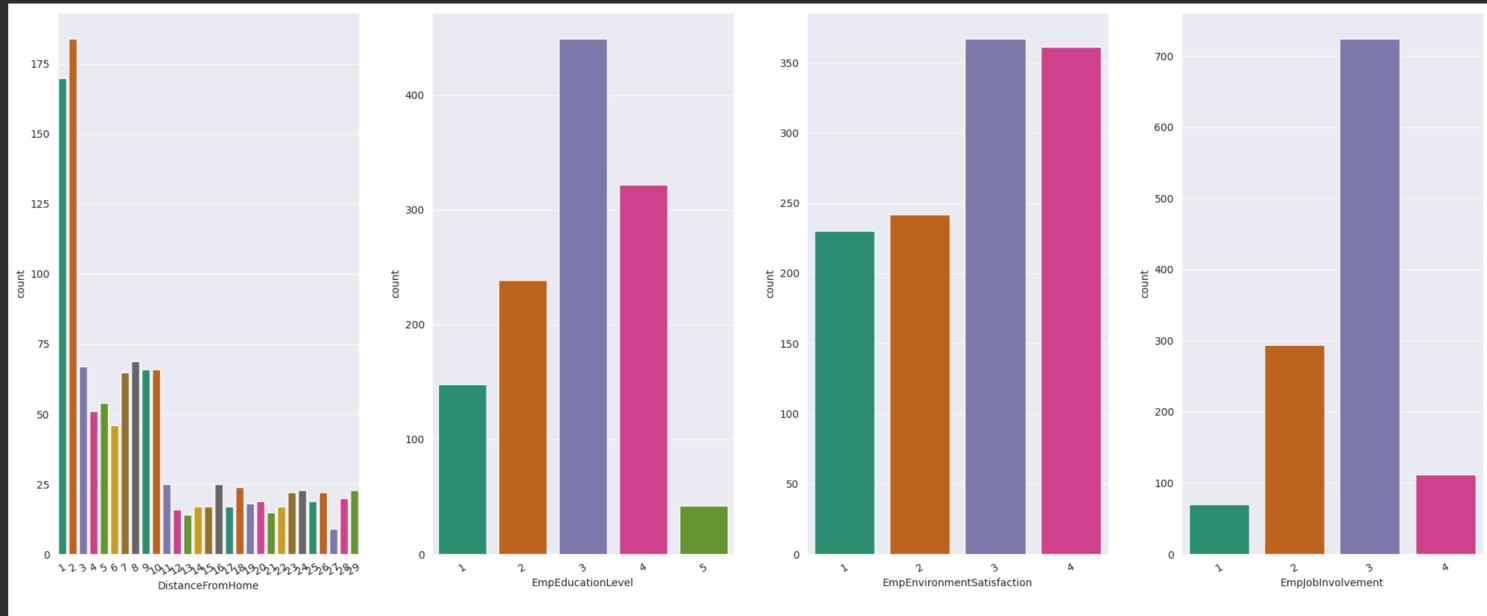
7. Marital Status

- Most employees are Married, followed by Single, with the fewest being Divorced.
- This may reflect a more mature or stable workforce demographic.

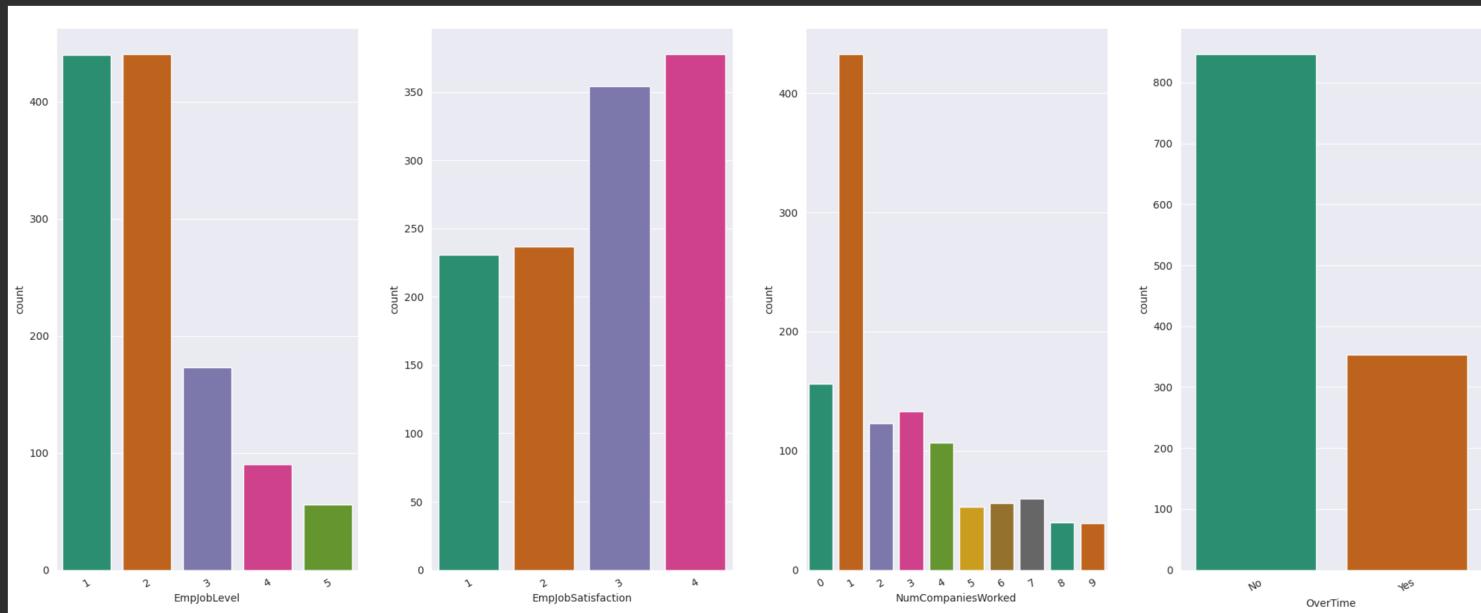
8. Business Travel Frequency

- The majority of employees Travel Rarely for work.
- A small number travel Frequently, and very few do Not Travel at all.
- This indicates a moderate level of business travel in most roles.

Basic Analysis



Basic Analysis



13.EmpJobLevel

- Most employees are at Level 1 or 2, suggesting many are in entry or mid-level roles.
- Higher levels (4 and 5) have far fewer people — a typical organizational hierarchy.

14.EmpJobSatisfaction

- Job satisfaction is predominantly High (3) and Very High (4).
- Very few employees report Low (1) satisfaction.
- This implies that most employees are content with their jobs.

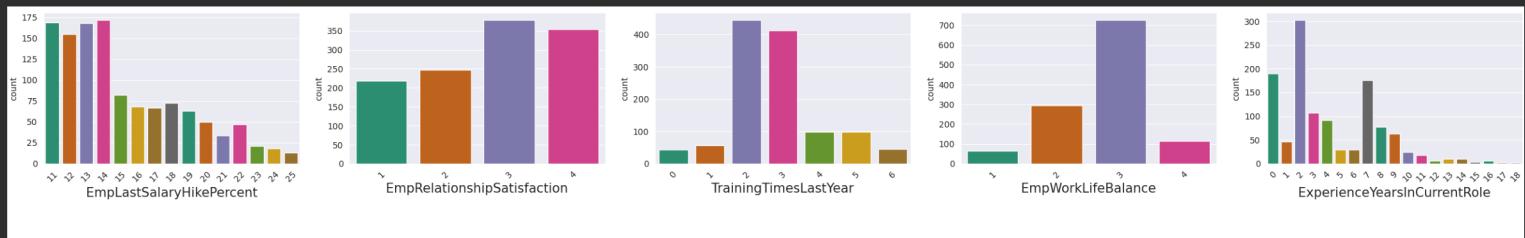
15.NumCompaniesWorked

- The most common number is 1, meaning many employees are in their first job.
- Less no of employee work in more than 5 companies
- The number gradually declines with more companies worked.
- This may reflect employee loyalty or a younger workforce.

16.OverTime

Most no of employee on doing over time and less than 350 employee doing overtime in company.

Basic Analysis



17. EmpLastSalaryHikePercent

- Most common salary hikes are in the 11–14% range.
- The frequency decreases steadily beyond 15%, with very few receiving 22% or more.
- Suggests that most salary increments are conservative.

18. EmpRelationshipSatisfaction

(Mapped: 1 – Low, 2 – Medium, 3 – High, 4 – Very High)

- Majority of employees report High (3) or Very High (4) relationship satisfaction.
- Very few are in the Low (1) category.
- Indicates healthy workplace relationships overall.

19. TrainingTimesLastYear

- Most employees received training 2 or 3 times last year.
- Very few had no training, and a small group received 4–6 training sessions.
- The organization invests moderately in upskilling.

20. EmpWorkLifeBalance

(Mapped: 1 – Bad, 2 – Good, 3 – Better, 4 – Best)

- Majority rate their work-life balance as Better (3).
- A smaller but significant group rates it as Good (2).
- Few rate it as Bad (1) or Best (4).
- Indicates room for improvement but generally positive perceptions.

21. ExperienceYearsInCurrentRole

- Most employees have 2–4 years of experience in their current role.
- Very few have more than 10 years.
- Suggests either role rotation, promotions, or turnover after a few years.

Basic Analysis



22. YearsSinceLastPromotion

- Most employees were promoted within the last 0-1 year.
- Promotion frequency drops drastically after 2 years.
- This could reflect either a recent promotion wave or fast-track career progression.

23. YearsWithCurrManager

- Most employees have worked with their current manager for 2 years, followed by 0-1 years.
- Relationships lasting 8 years or more are rare.
- May indicate frequent reorganization or management shifts.

24. Attrition

- Majority of employees are still with the company (No Attrition).
- A smaller segment has left (Yes).
- This hints at a relatively low attrition rate, though deeper analysis may reveal influencing factors.

25. PerformanceRating

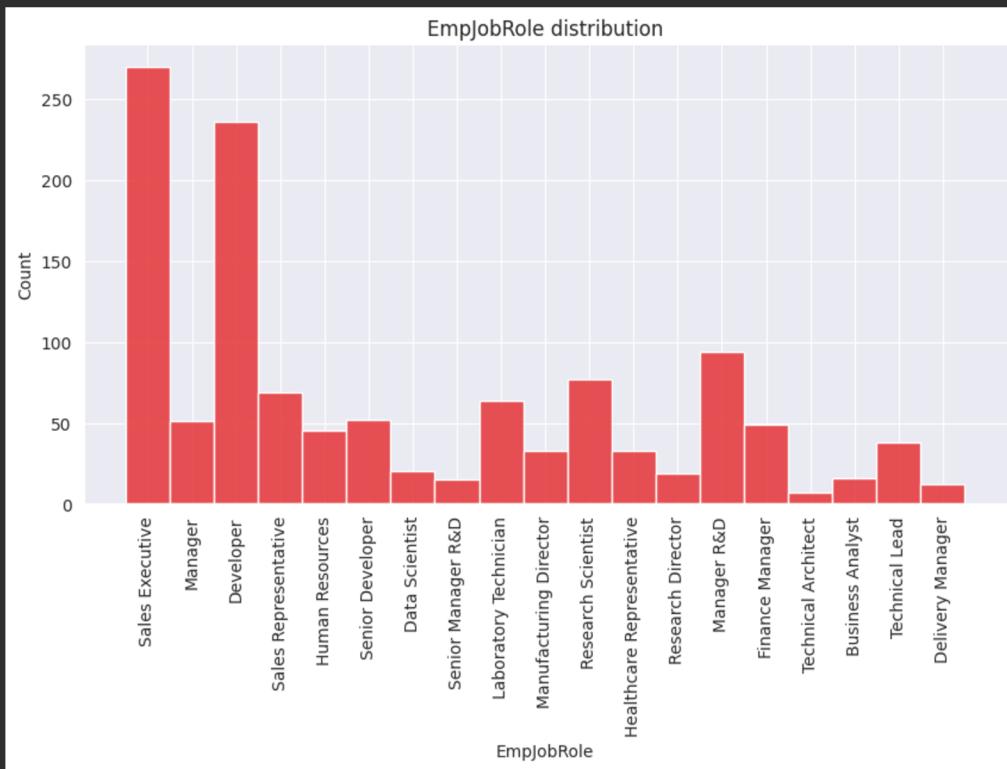
(Mapped: 1 – Low, 2 – Good, 3 – Excellent, 4 – Outstanding)

- Most employees are rated Excellent (3).
- Some receive Good (2), and fewer are Outstanding (4).
- This skew could suggest inflated ratings or a high-performing workforce.

26. EmpDepartment

- The largest departments are Sales, Development, and Research & Development.
- Human Resources, Finance, and especially Data Science are much smaller.
- Reflects organizational focus on technical and customer-facing functions.

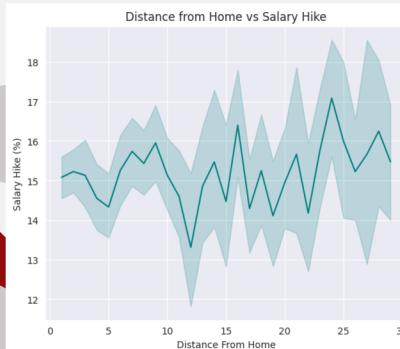
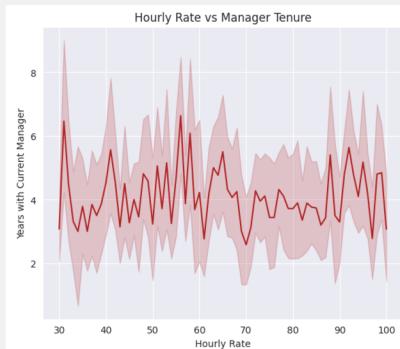
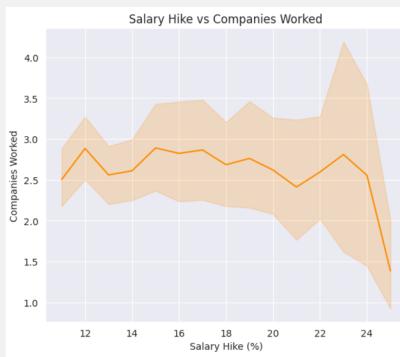
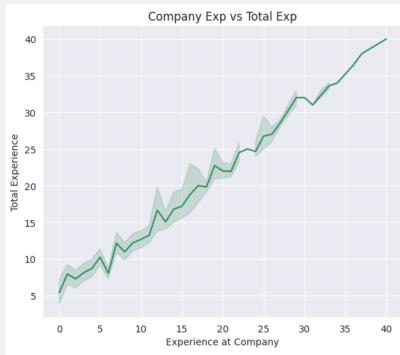
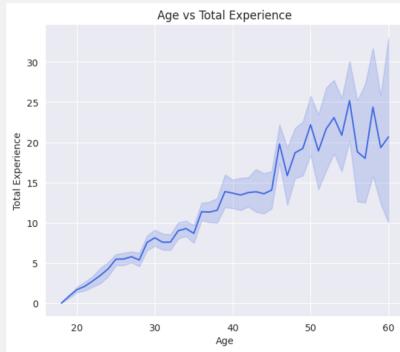
Basic Analysis



27. EmpJobRole

- Top Roles:**
 - Sales Executive and Developer are by far the most common roles in the company.
 - Sales Executive has the highest count, suggesting a sales-driven business model.
 - Developers follow closely, indicating a strong tech or product development team.
- Mid-Level Representation:**
 - Roles like Manager, Research Scientist, Laboratory Technician, and Manager R&D are moderately represented.
 - Suggests a balanced organizational structure with reasonable presence in both managerial and R&D functions.
- Specialized Roles (Lower Count):**
 - Positions such as Data Scientist, Senior Developer, Technical Architect, and Business Analyst appear in smaller numbers.
 - These could be niche roles or relatively newer functions within the company.
- Least Common Roles:**
 - Healthcare Representative, Delivery Manager, and Research Director have the lowest counts.
 - This might reflect either a low demand or specific needs fulfilled by a small team.
- Insights:**
 - The high number of employees in executional and technical roles aligns with earlier findings (e.g., dominance of Sales and Development departments).
 - The role distribution shows that while the company is execution-heavy, it still maintains strategic and technical leadership with various managerial and specialist roles.

2-Variable Analysis



1. Age vs Total Work Experience

- There is a clear linear relationship: the older the employee, the more total years of experience they have.
- Most employees aged <25 years have about 5 years of experience in this company

2. Experience at Company vs Total Work Experience

- Total work experience increases with years at the current company, but not all long-tenured employees have high total experience.
- There's a slight divergence: some employees have high total experience but shorter tenure at the current company → likely due to job-hopping in the past.
- This reflects a diverse career background among the workforce.

3. Salary Hike % vs Number of Companies Worked

- The chart shows strong fluctuations and no clear trend between last salary hike % and the number of companies worked for.
- This suggests that salary increments might not be influenced by how many companies an employee has worked at.
- Interestingly, employees with the highest salary hikes seem to have worked at fewer companies

4. Years Since Last Promotion vs Experience In Current Role

- There is a mild positive correlation: the longer it's been since a promotion, the longer the employee has been in their current role.
- This is intuitive — employees who haven't been promoted recently likely stay in the same position.
- Still, there are some large fluctuations, possibly due to varying promotion policies across departments.

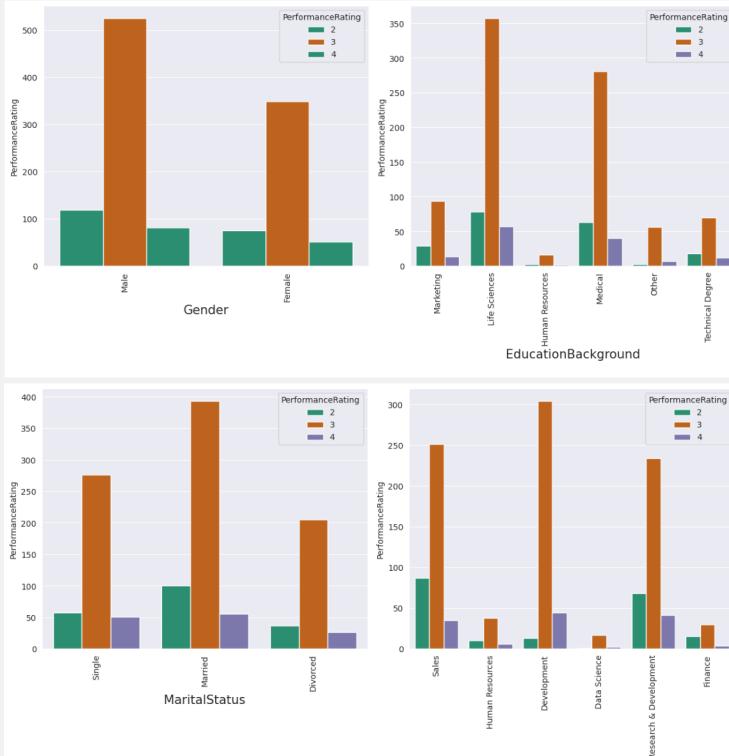
5. Hourly Rate vs Years With Current Manager

- The chart is highly scattered, showing no strong correlation.
- This suggests that hourly rate isn't closely tied to the tenure with the current manager.
- It may depend more on technical skills, job role, or other compensation structures.

6. Distance From Home vs Last Salary Hike %

- There's a slight upward trend: employees who live farther from work might be receiving higher salary hikes.
- This could be due to the company offering incentives or compensation to retain employees who commute long distances.
- However, the wide spread of data suggests this relationship is not very strong and could vary depending on job type, location, etc.

Analysis on Categorical feature



3. Marital Status

- The Married group has the highest number of employees.
- PerformanceRating = 3 remains the most common across all groups (Single, Married, Divorced).

4. Emp Department

- Research & Development has the highest number of employees.
- All departments lean toward rating 3.
- Further analysis (e.g., linking with department KPIs) could provide deeper insights.

1. Gender

- Both males and females have the majority of employees rated at PerformanceRating = 3.
- Males have a higher number of employees across all rating levels.
- There is no significant difference in rating distribution by gender.

2. EducationBackground

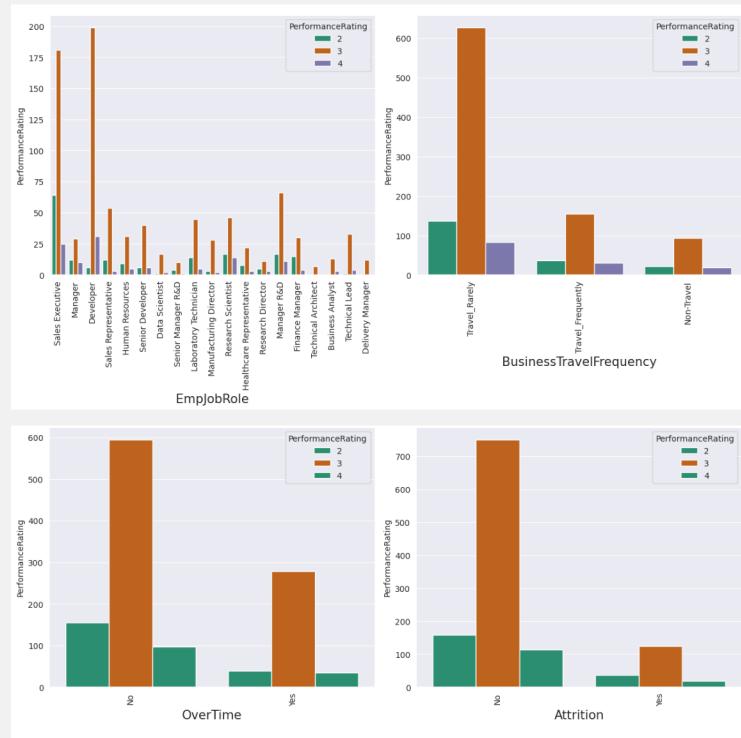
- Employees from Life Sciences and Medical backgrounds are the most common.
- Rating 3 dominates across all educational backgrounds.
- Despite different education backgrounds, most employees receive an average rating (3).
- However, those in Technical Degree and Medical fields tend to have a more stable proportion at rating 4 → possibly due to technical expertise.

5.Emp Job Role

- Common roles include Sales Executive, Developer, and Research Scientist.
- Employees across all roles mainly receive PerformanceRating = 3.
- Some roles show slight variations toward rating 2 or 4.

6.Business Travel Frequency

- The Travel_Rarely group is the largest, with most ratings at 3.
- The Travel_Frequently group is smaller but has a relatively higher proportion of rating 4.
- Employees who travel frequently tend to receive higher ratings, possibly reflecting higher responsibility and dynamism.



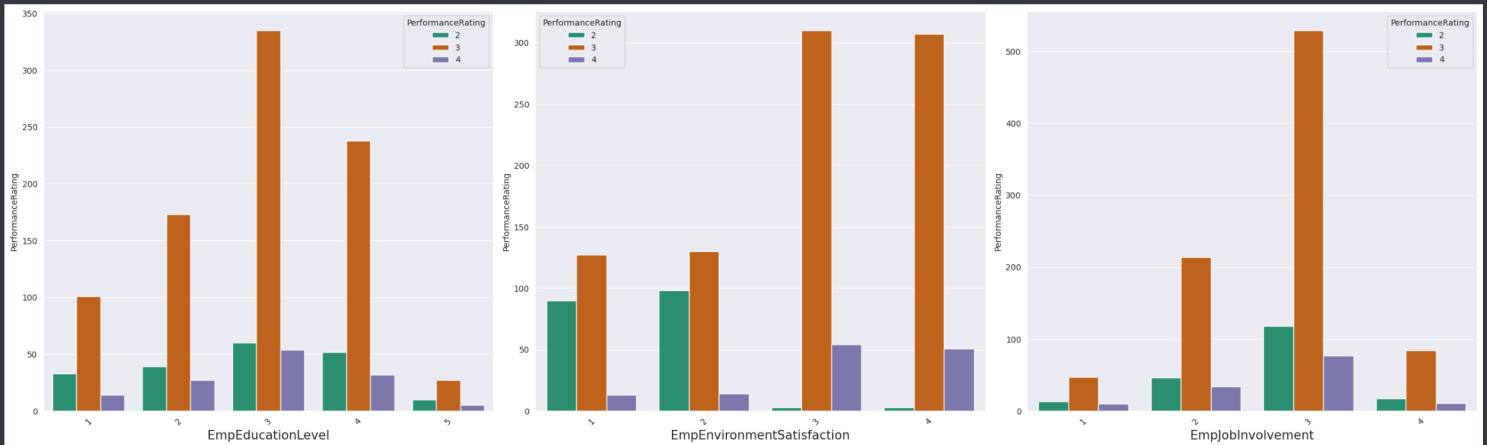
Analysis on Categorical feature

7.OverTime

- Employees not working overtime form the majority, mostly rated at 3.
- Employees working overtime show a similar distribution but in smaller numbers.
- Overtime work does not correlate with higher PerformanceRating.

8.Attrition (Employee Turnover)

- Employees who stayed are the majority and mostly rated at 3.
- Employees who left have a similar pattern but in smaller numbers.



Analysis on Discrete feature

1. EmpEducationLevel:

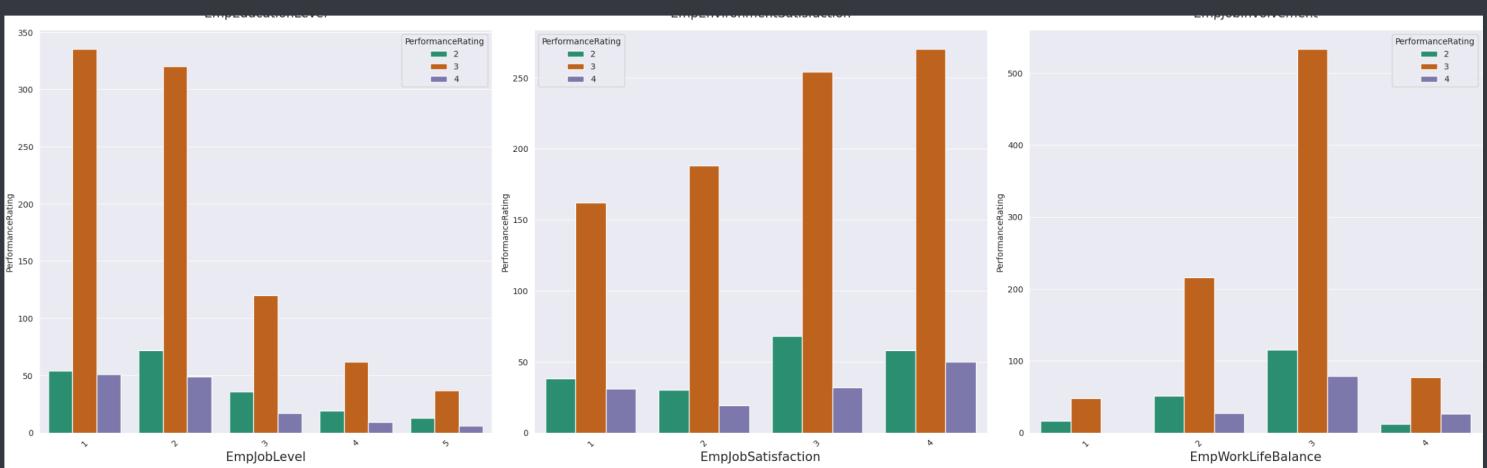
- Employees with a Bachelor's degree (3) make up the majority and also tend to have higher Performance Ratings.
- There is no clear trend indicating that having a Master's or Doctorate degree leads to better Performance Ratings.

2. EmpEnvironmentSatisfaction

- Employees with High or Very High (3/4) environment satisfaction levels are more likely to receive an Outstanding (4) rating.

3. EmpJobInvolvement

- High or Very High (3/4) job involvement is more commonly associated with an Outstanding Performance Rating.



4. EmpJobLevel

- Job Levels 1 and 2 account for the majority.
- Across all job levels, a Performance Rating of 3 is predominant.
- There is no trend showing increased ratings with higher job levels.

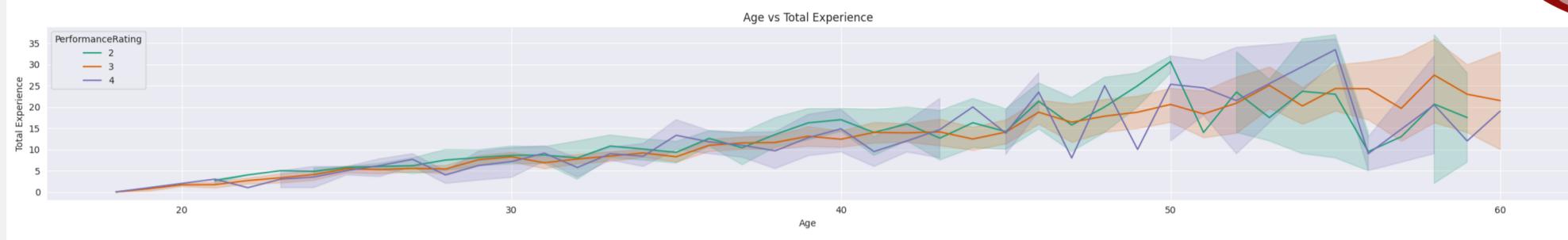
5. EmpJobSatisfaction

- High or Very High (3/4) job satisfaction is directly linked to higher Performance Ratings.

6. EmpWorkLifeBalance

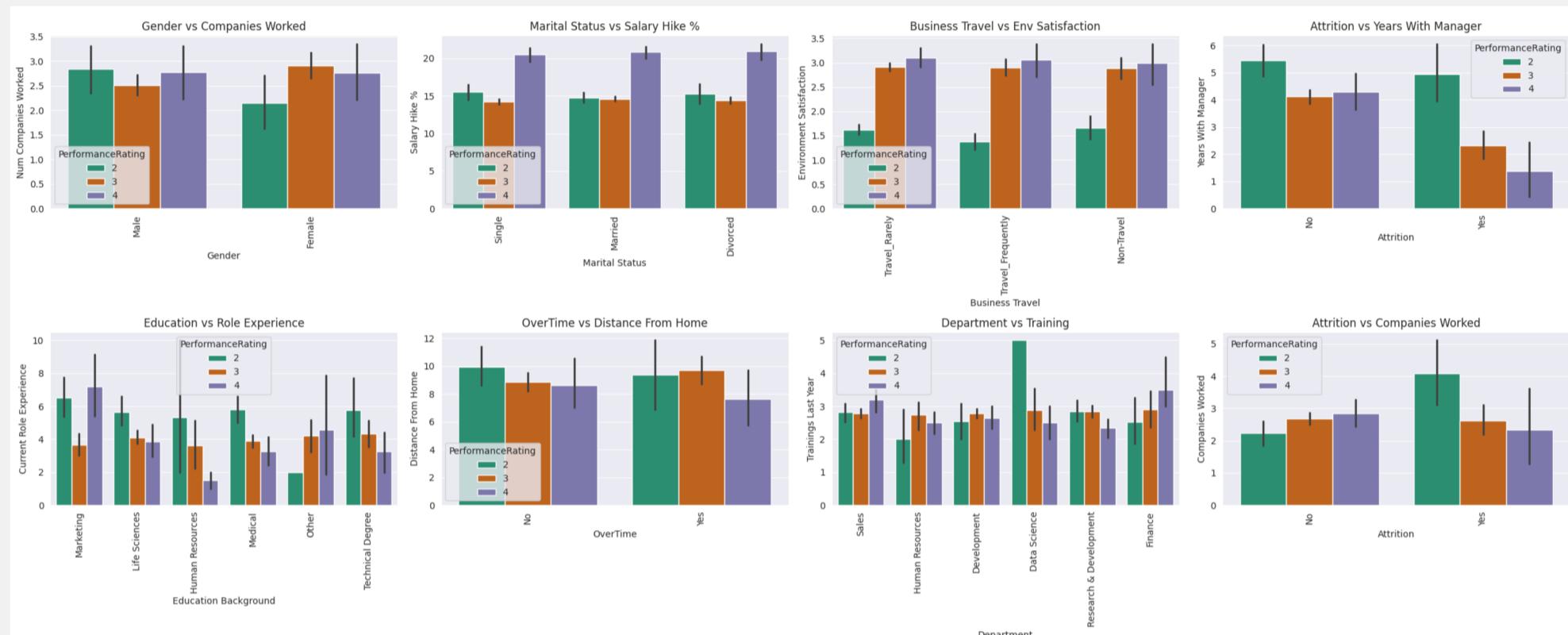
- A Better or Best (3/4) work-life balance is often associated with better performance, suggesting that maintaining balance between work and personal life contributes to improved performance.

Multivariate Analysis



1. Age vs Total Experience

- Employees with a Performance Rating of 4 tend to have more total years of experience, especially in the middle-age range (35–50).
- Experience positively influences job performance. Older, more experienced employees are more likely to achieve higher performance.



2. Gender vs Companies Worked

- There is no clear difference between males and females in terms of the number of companies worked at. However:
- Employees with a Performance Rating of 4 have worked at fewer companies. Stable employees who change jobs less frequently may be rated more highly.

3. Marital Status vs Salary Hike %

- Married employees with higher Performance Ratings tend to receive larger salary increases.
- Single employees tend to have lower salary hikes. Employees with a more stable personal life (i.e., married) may be better recognized and rewarded.

4. Business Travel vs Environment Satisfaction

- No significant differences between the groups.

5. Attrition vs Years With Manager

- Employees who did not leave the company (Attrition = No) tend to have longer tenures with their managers.
- Employees with a Performance Rating of 4 have spent the most years working with their managers.
- A long-term relationship with a manager may help improve performance and reduce attrition.

6. Education vs Role Experience

- In fields like Marketing, Medical, and Life Sciences, employees with higher Performance Ratings often have more experience in their current roles.

7. OverTime vs Distance From Home

- Employees who work overtime (OverTime = Yes) tend to live closer to the workplace, especially those with a Performance Rating of 4.
- Distance from home may influence an employee's willingness to work overtime, which can indirectly affect performance.

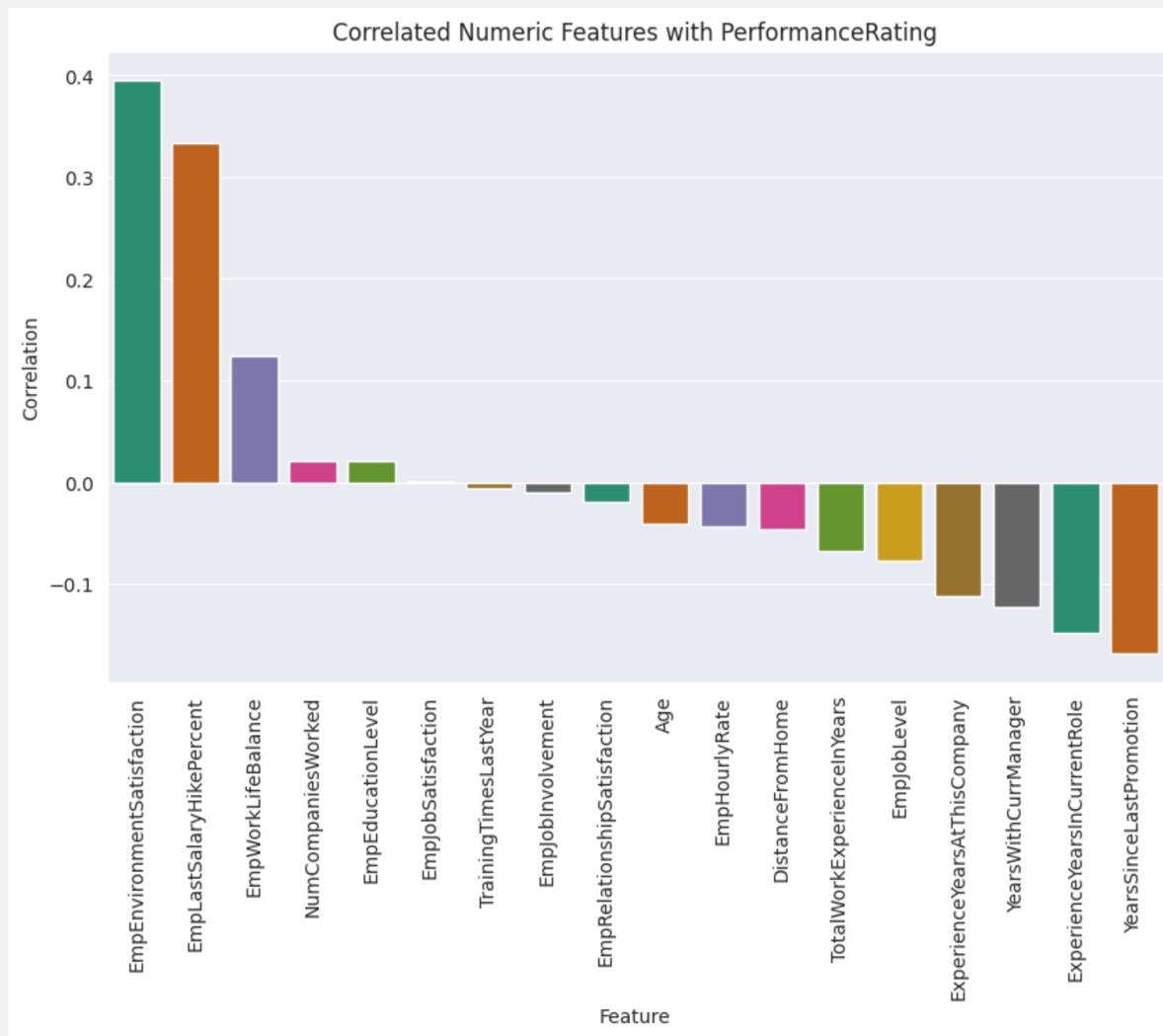
8. Department vs Training

- The Data Science department has the highest average number of training sessions.
- However, Performance Rating = 4 is not concentrated solely in this department — suggesting that more training does not directly lead to higher performance.
- Training is essential, but the effectiveness and application of training are the key factors.

9. Attrition vs Companies Worked

- Employees who left the company (Attrition = Yes) tend to have worked at more companies.
- Those with low Performance Ratings (2) are the group that has worked at the most companies.
- Employees who frequently switch jobs are less likely to maintain high performance.

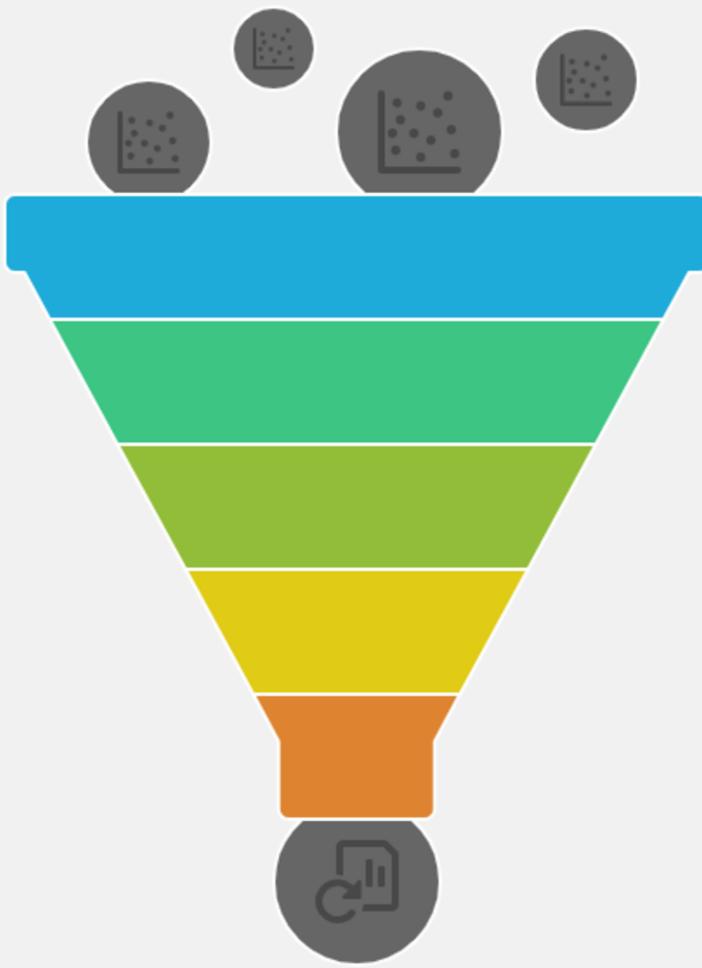
Factor Affecting to the Employee Performance



Top 3 correlated numeric features with PerformanceRating:

- Emp Environment Satisfaction
- Emp Last Salary Hike Percent
- Emp Work Life Balance

Data Processing



Handle Missing Values

Address gaps in data



Encode Data

Convert categorical data



Check Duplicates

Remove redundant entries



Check Skewness

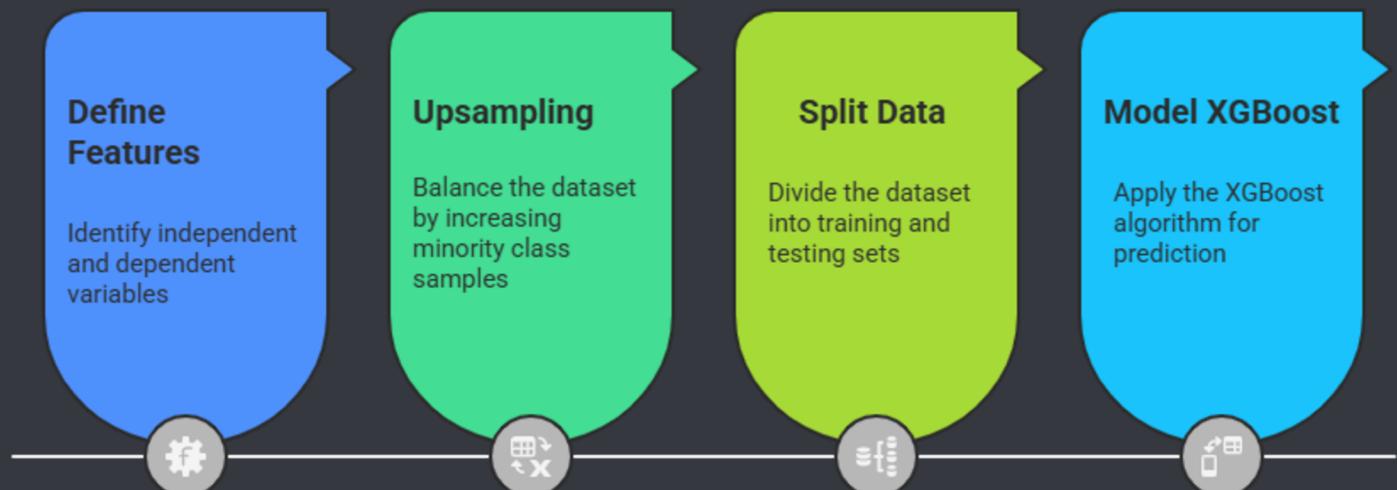
Assess data distribution



Check Outliers

Replace Outlier values with Median

Employee Performance Forecasting



Class	Precision	Recall	F1-score	Support
2	0.96	0.95	0.95	185
3	0.92	0.95	0.94	169
4	0.98	0.96	0.97	171

Metric	Score
Accuracy	0.9543
Precision Score	0.9547
Macro Avg	0.95
Weighted Avg	0.95

Training Results

- Employees who stayed are the majority and mostly rated at 3.
- Employees who left have a similar pattern but in smaller numbers.

Class	Precision	Recall	F1-score	Support
2	0.96	0.95	0.95	185
3	0.92	0.95	0.94	169
4	0.98	0.96	0.97	171

Testing Results

- Despite the overfitting, the model still performs very well on the test data.
- High accuracy (>95%) and F1-scores above 0.94 for all classes.
- No classes are missed or too weak, the classification is quite balanced.

Metric	Score
Accuracy	0.9543
Precision Score	0.9547
Macro Avg	0.95
Weighted Avg	0.95

Recommendations

Enhance Work Environment:

- Foster a positive, inclusive, and motivating workplace.

Regular Salary Increases:

- Use transparent, performance-based raises to boost motivation.

Biannual Promotions:

- Promote every 6 months with clear and fair performance criteria.

Improve Work-Life Balance:

- Offer flexible hours, wellness programs, and sufficient leave.

Prioritize Women in HR Hiring:

- Leverage strong female performance in HR roles for better outcomes.

Invest in Development & Sales:

- Focus training and incentives on these high-performing departments.

Support High Performers with Low Satisfaction:

- Engage and retain top performers who report low to medium satisfaction.



Conclusion

The "**HR Employee Performance Analysis and Forecasting**" project has provided in-depth and comprehensive insights into employee performance through data analysis and the application of statistical and machine learning models. By identifying key factors affecting performance and forecasting future trends, the project offers valuable support for HR departments in making informed decisions related to recruitment, training, talent retention, and organizational performance optimization. Moving forward, integrating more diverse data sources and regularly updating the models will further improve the accuracy and practical applicability of the analysis and forecasting system.