# Employee Attrition Data Analysis

![](data:application/octet-stream;base64,)

## About the dataset

The dataset comprises 1,000 entries detailing employee attributes and attrition status. Key columns include Employee\_ID, Age, Gender, Department, Job\_Title, Years\_at\_Company, Satisfaction\_Level, Average\_Monthly\_Hours, Promotion\_Last\_5Years, Salary, and Attrition. The data provides insights into employee demographics, job roles, and their correlation with attrition.

From the sample data, we observe a diverse range of ages and job titles across different departments. For instance, the sample includes employees from Finance, Sales, Engineering, and HR, with job titles such as Manager and Engineer. The Satisfaction\_Level column, with a mean of 0.51, indicates varying levels of job satisfaction, which could influence attrition. Notably, the sample shows a high satisfaction level for a Finance Manager (0.82) who has been with the company for 9 years, yet this individual has experienced attrition. Conversely, a Sales Manager with a low satisfaction level (0.18) and 10 years at the company has not left, suggesting other factors like promotion and salary might play a role.

The dataset also highlights the impact of promotions and working hours on attrition. For example, employees with recent promotions and higher average monthly hours, such as an Engineering Manager, show no attrition despite lower satisfaction levels. This suggests that career advancement opportunities and workload might mitigate dissatisfaction. Overall, the data provides a comprehensive view of factors influencing employee retention and turnover.

## Relevant Inquiries

### Q1. Departmental Evenness in Average Monthly Hours

![](data:application/octet-stream;base64,)

The analysis of average monthly hours across various departments reveals a striking uniformity, as indicated by the visualization. Each department—Engineering, Finance, HR, Marketing, and Sales—exhibits a mean of approximately 200 hours, suggesting a balanced workload distribution among them. This evenness is further supported by the low standard deviation of 0.005, indicating minimal variation in average hours worked across departments.

Such consistency in average monthly hours can have significant implications for workforce management and employee satisfaction. It suggests that no single department is overburdened compared to others, which can foster a collaborative environment and enhance overall productivity. However, it may also prompt a closer examination of whether this uniformity aligns with the specific demands and outputs expected from each department, ensuring that all teams are adequately resourced to meet their unique challenges.

### Q2. Job Title Satisfaction Levels: A Comparative Analysis

![](data:application/octet-stream;base64,)

The analysis of employee satisfaction levels across various job titles reveals a notable trend. The average satisfaction levels for most roles, including Accountant, HR Specialist, Analyst, and Engineer, hover around 0.51, indicating a relatively high level of contentment among these positions. However, the Manager role stands out with a slightly lower satisfaction level of 0.49, which is visually represented in the red bar of the chart.

This discrepancy suggests that while managerial positions generally come with increased responsibilities, they may also face unique challenges that could impact employee satisfaction. The consistent satisfaction levels among the other job titles imply a stable work environment, but the dip in satisfaction for Managers warrants further investigation. Understanding the factors contributing to this lower satisfaction could be crucial for organizations aiming to enhance employee morale and retention in leadership roles.

### Q3. Gender-Based Satisfaction Level Analysis

![](data:application/octet-stream;base64,)

The analysis of satisfaction levels by gender reveals a slight predominance of male respondents, who account for 51.5% of the total, compared to 48.5% for female respondents. This marginal difference suggests that male participants may have a slightly higher representation in the dataset, which could influence the overall satisfaction metrics.

The mean satisfaction level, as indicated in the visualization, highlights the importance of considering gender when interpreting satisfaction data. Understanding these demographic nuances can provide valuable insights for organizations aiming to enhance employee or customer satisfaction. Further investigation into the factors contributing to these satisfaction levels among different genders could yield actionable strategies for improvement.

### Q4. Analysis of Age and Salary Correlation by Years at Company

![](data:application/octet-stream;base64,)

The analysis reveals a moderate positive correlation (Pearson weight of approximately 0.30) between the average age of employees and the total salary disbursed, segmented by the number of years they have been with the company. This suggests that as employees age, their cumulative salary tends to increase, albeit the correlation is not particularly strong.

The visualization indicates that while there is some relationship between age and salary, the data points are clustered closely together, suggesting limited variability in salary across different age groups. This could imply that salary increases may not be significantly influenced by age alone, and other factors such as job role, performance, or market conditions might play a more critical role in determining salary levels. Further investigation into these factors could provide deeper insights into the compensation structure within the organization.

### Q5. Salary Distribution by Job Title for Long-Term Employees

![](data:application/octet-stream;base64,)

The analysis reveals a significant disparity in salaries among various job titles for employees who have been with the company for ten years and have not experienced attrition. The role of Engineer stands out prominently, with a total salary sum of approximately 1.2 million, making it the highest-paid position in this category. This indicates that engineering roles are highly valued within the organization, likely due to their critical contributions to projects and overall company success.

In contrast, other job titles such as Manager, Accountant, HR Specialist, and Analyst show considerably lower salary sums, ranging from around 385,000 to 713,000. This suggests that while these roles are essential, they may not command the same financial recognition as engineering positions. The data highlights the importance of job function in salary determination, reflecting industry trends where technical skills often lead to higher compensation. Overall, the findings underscore the need for organizations to evaluate their compensation structures to ensure they align with the value provided by different roles.

### Q6.What is the distribution of attrition rates across different departments?

![](data:application/octet-stream;base64,)

#### Attrition Rates by Department

* **Engineering**: The attrition rate is **53.43%**, the highest among all departments.
* **Finance**: The attrition rate is **51.94%**, slightly lower than Engineering.
* **HR**: The attrition rate is **50.26%**, around the average.
* **Marketing**: The attrition rate is **42.11%**, the lowest among the departments.
* **Sales**: The attrition rate is **49.28%**, close to the overall mean.

#### Visualization of Attrition Rates

* The bar chart illustrates that **Engineering** and **Finance** have the highest attrition rates, while **Marketing** has the lowest.

#### Conclusion and Insights

* **Key Insight 1**: Engineering and Finance departments have notably higher attrition rates, indicating potential areas for further investigation and intervention.
* **Key Insight 2**: Marketing's lower attrition rate suggests effective retention strategies that could be analyzed and potentially applied to other departments.

### Q7.How does the satisfaction level correlate with the average monthly hours worked?

![](data:application/octet-stream;base64,)

#### Correlation Value

* **Correlation Coefficient**: The correlation between 'Satisfaction\_Level' and 'Average\_Monthly\_Hours' is approximately **-0.009**. This indicates a very weak negative correlation, suggesting that there is almost no linear relationship between these two variables.

#### Visualization

* **Scatter Plot**: The scatter plot visualizes the relationship between satisfaction level and average monthly hours worked. The plot shows a single point, reinforcing the finding of a negligible correlation.

#### Conclusion and Insights

* **Negligible Correlation**: The satisfaction level does not significantly correlate with the average monthly hours worked, indicating that other factors might influence employee satisfaction more strongly.
* **Further Investigation**: It may be beneficial to explore other variables that could impact satisfaction levels, such as work-life balance, job role, or company culture.

### Q8.What are the key factors, besides promotion, that contribute to employee attrition in this dataset?

#### Numerical Variables Analysis

* **Correlation with Attrition**: The dataset does not provide specific correlation values for numerical variables such as 'Age', 'Years\_at\_Company', 'Satisfaction\_Level', 'Average\_Monthly\_Hours', and 'Salary'. Therefore, it is not possible to determine their direct impact on attrition from the given data.

#### Categorical Variables Analysis

* **Gender**: The attrition rate for females is slightly higher (0.512) compared to males (0.478). This suggests that gender may have a minor influence on attrition rates.
* **Department**: The Engineering department shows the highest attrition rate (0.534), followed by Finance (0.519) and HR (0.503). Marketing has the lowest attrition rate (0.421), indicating that department affiliation significantly affects attrition.
* **Job Title**: Among job titles, the HR Specialist has the highest attrition rate (0.514), while the Engineer has the lowest (0.472). This variation suggests that job title is a relevant factor in employee attrition.

#### Conclusion and Insights

* **Department and Job Title**: These are significant factors influencing attrition, with certain departments and job titles experiencing higher attrition rates.
* **Gender**: There is a slight difference in attrition rates between genders, which may warrant further investigation to understand underlying causes.

### Q9.Analyze the correlation between average monthly hours and attrition across different job titles. How does workload impact employee turnover?

![](data:application/octet-stream;base64,)

#### Correlation Data

* **Accountant**: The correlation between average monthly hours and attrition is approximately **-0.0045**, indicating a negligible relationship.
* **Analyst**: Shows a correlation of **-0.0532**, suggesting a slight negative relationship between workload and attrition.
* **Engineer**: Has a correlation of **0.0109**, indicating a very weak positive relationship.
* **HR Specialist**: Displays a correlation of **0.0136**, also suggesting a minimal positive relationship.
* **Manager**: Exhibits a correlation of **-0.0777**, indicating a slightly stronger negative relationship compared to other roles.

#### Visualization Insights

* The bar chart illustrates that most job titles have correlations close to zero, indicating little to no impact of average monthly hours on attrition.
* The **Manager** role shows the most significant negative correlation, suggesting that higher average monthly hours might slightly reduce attrition in this group.

#### Conclusion and Insights

* **Overall Impact**: The correlation between average monthly hours and attrition is generally weak across all job titles, indicating that workload alone may not be a significant factor in employee turnover.
* **Role-Specific Observations**: Managers show a slightly stronger negative correlation, which could imply that increased workload might be associated with lower attrition, possibly due to job satisfaction or engagement factors not captured in this analysis.

### Q10.Are there any noticeable patterns in attrition rates based on the number of years an employee has been at the company?

![](data:application/octet-stream;base64,)

#### Attrition Rate Analysis

* **High Attrition in Early Years**: Employees with 2 years at the company have the highest attrition rate at approximately 0.59.
* **Lower Attrition in Mid Years**: Attrition rates decrease slightly for employees with 3 to 5 years at the company, with the lowest rate at 5 years (0.43).
* **Increased Attrition in Later Years**: Attrition rates rise again for employees with 6 to 9 years, peaking at 7 years (0.55).

#### Visual Representation

* **Bar Chart Insights**: The bar chart visually confirms the fluctuation in attrition rates, with noticeable peaks at 2 and 7 years.

#### Conclusion and Insights

* **Early Departure**: High attrition in the early years suggests potential onboarding or job satisfaction issues.
* **Retention Opportunities**: Lower attrition in mid years indicates a period of stability, which could be leveraged for retention strategies.
* **Re-evaluation in Later Years**: The increase in attrition after 6 years may require re-evaluation of career progression and employee engagement strategies.