

Deciphering Departures: Exploring Attrition Patterns in HR Analytics

Analysis of Employee Turnover:

The methodology involved cleaning and preprocessing the dataset, conducting exploratory data analysis, and data visualization techniques to extract actionable insights. The findings from this analysis offer valuable insights into the drivers of "employee turnover" within our organization, providing a foundation for developing targeted retention strategies and fostering a more supportive and engaging work environment.

Through this project, we demonstrate the power of HR Analytics in informing strategic decision-making and driving organizational success. By understanding the dynamics of employee attrition and proactively addressing its root causes, we can cultivate a workplace culture that values and retains top talent, ultimately contributing to the long-term sustainability and growth of our company.

```
In [197]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

```
In [3]: df=pd.read_csv("HR_Analytics.csv")
df.head()
```

Out[3]:

	EmplID	Age	AgeGroup	Attrition	BusinessTravel	DailyRate	Department	DistanceFrom
0	RM297	18	18-25	Yes	Travel_Rarely	230	Research & Development	
1	RM302	18	18-25	No	Travel_Rarely	812	Sales	
2	RM458	18	18-25	Yes	Travel_Frequently	1306	Sales	
3	RM728	18	18-25	No	Non-Travel	287	Research & Development	
4	RM829	18	18-25	Yes	Non-Travel	247	Research & Development	

5 rows × 38 columns

In [154]: `df.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1480 entries, 0 to 1479
Data columns (total 39 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   EmpID                                1480 non-null   object
1   Age                                  1480 non-null   int64
2   AgeGroup                             1480 non-null   object
3   Attrition                            1480 non-null   object
4   BusinessTravel                       1480 non-null   object
5   DailyRate                            1480 non-null   int64
6   Department                           1480 non-null   object
7   DistanceFromHome                     1480 non-null   int64
8   Education                             1480 non-null   int64
9   EducationField                       1480 non-null   object
10  EmployeeCount                         1480 non-null   int64
11  EmployeeNumber                       1480 non-null   int64
12  EnvironmentSatisfaction               1480 non-null   int64
13  Gender                                1480 non-null   object
14  HourlyRate                           1480 non-null   int64
15  JobInvolvement                       1480 non-null   int64
16  JobLevel                             1480 non-null   int64
17  JobRole                              1480 non-null   object
18  JobSatisfaction                      1480 non-null   int64
19  MaritalStatus                        1480 non-null   object
20  MonthlyIncome                       1480 non-null   int64
21  SalarySlab                           1480 non-null   object
22  MonthlyRate                          1480 non-null   int64
23  NumCompaniesWorked                  1480 non-null   int64
24  Over18                              1480 non-null   object
25  OverTime                             1480 non-null   object
26  PercentSalaryHike                   1480 non-null   int64
27  PerformanceRating                   1480 non-null   int64
28  RelationshipSatisfaction              1480 non-null   int64
29  StandardHours                       1480 non-null   int64
30  StockOptionLevel                    1480 non-null   int64
31  TotalWorkingYears                   1480 non-null   int64
32  TrainingTimesLastYear               1480 non-null   int64
33  WorkLifeBalance                     1480 non-null   int64
34  YearsAtCompany                      1480 non-null   int64
35  YearsInCurrentRole                  1480 non-null   int64
36  YearsSinceLastPromotion              1480 non-null   int64
37  YearsWithCurrManager                 1423 non-null   float64
38  AttritionCount                       1480 non-null   int64
dtypes: float64(1), int64(26), object(12)
memory usage: 451.1+ KB
```

```
In [25]: ▶ AttritionCount=[]
for i in df["Attrition"]:
    if i == "Yes":
        AttritionCount.append(1)
    else:
        AttritionCount.append(0)

df["AttritionCount"] = AttritionCount
df["AttritionCount"].head()
```

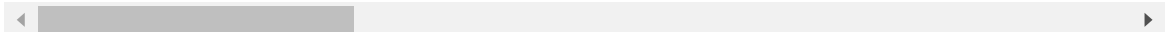
```
Out[25]: 0    1
         1    0
         2    1
         3    0
         4    1
         Name: AttritionCount, dtype: int64
```

```
In [26]: ▶ df.head()
```

```
Out[26]:
```

	EmplID	Age	AgeGroup	Attrition	BusinessTravel	DailyRate	Department	DistanceFrom
0	RM297	18	18-25	Yes	Travel_Rarely	230	Research & Development	
1	RM302	18	18-25	No	Travel_Rarely	812	Sales	
2	RM458	18	18-25	Yes	Travel_Frequently	1306	Sales	
3	RM728	18	18-25	No	Non-Travel	287	Research & Development	
4	RM829	18	18-25	Yes	Non-Travel	247	Research & Development	

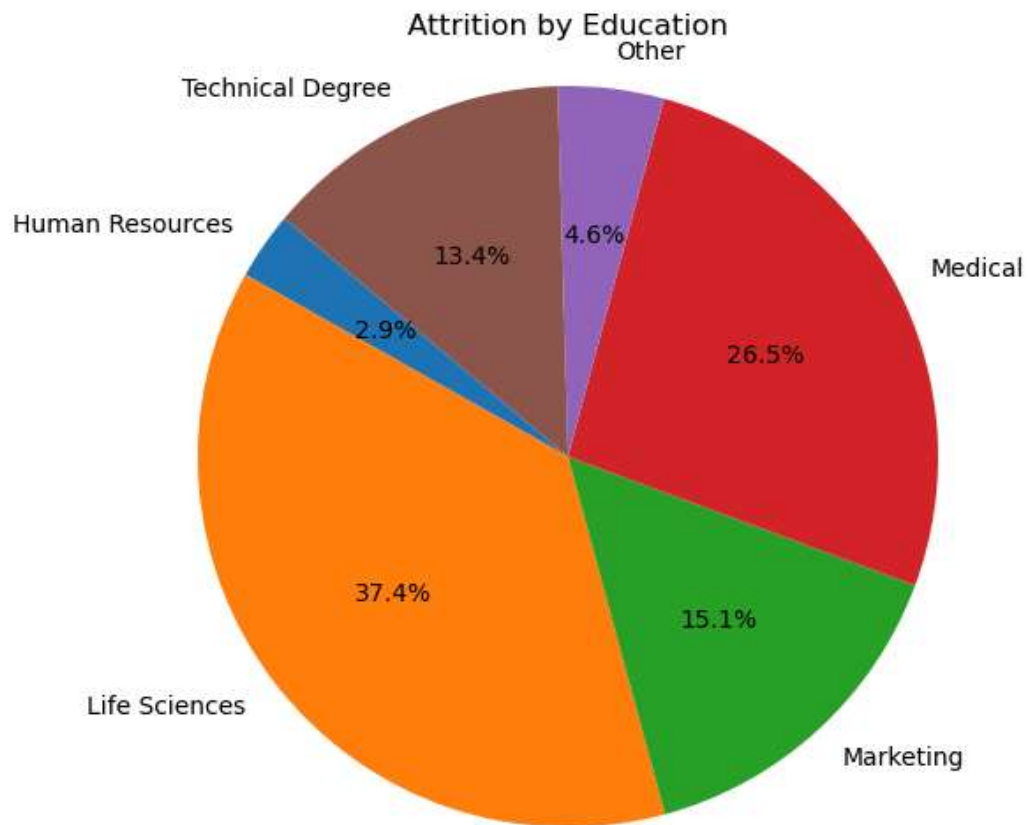
5 rows × 39 columns



```
In [58]: ▶ # Calculate the sum of AttritionCount based on EducationField
attrition_by_education = df.groupby('EducationField')['AttritionCount'].
attrition_by_education.head()
```

```
Out[58]: EducationField
Human Resources      7
Life Sciences       89
Marketing           36
Medical            63
Other              11
         Name: AttritionCount, dtype: int64
```

```
In [153]: # Create a pie chart
plt.figure(figsize=(8, 6))
plt.pie(attrition_by_education, labels=attrition_by_education.index, autopct='%1.1f%%')
plt.title('Attrition by Education')
plt.axis('equal') # Equal aspect ratio ensures that pie is drawn as a circle
plt.show()
```



```
In [57]: attrition_by_age = df.groupby('AgeGroup')['AttritionCount'].sum()
attrition_by_age.head()
```

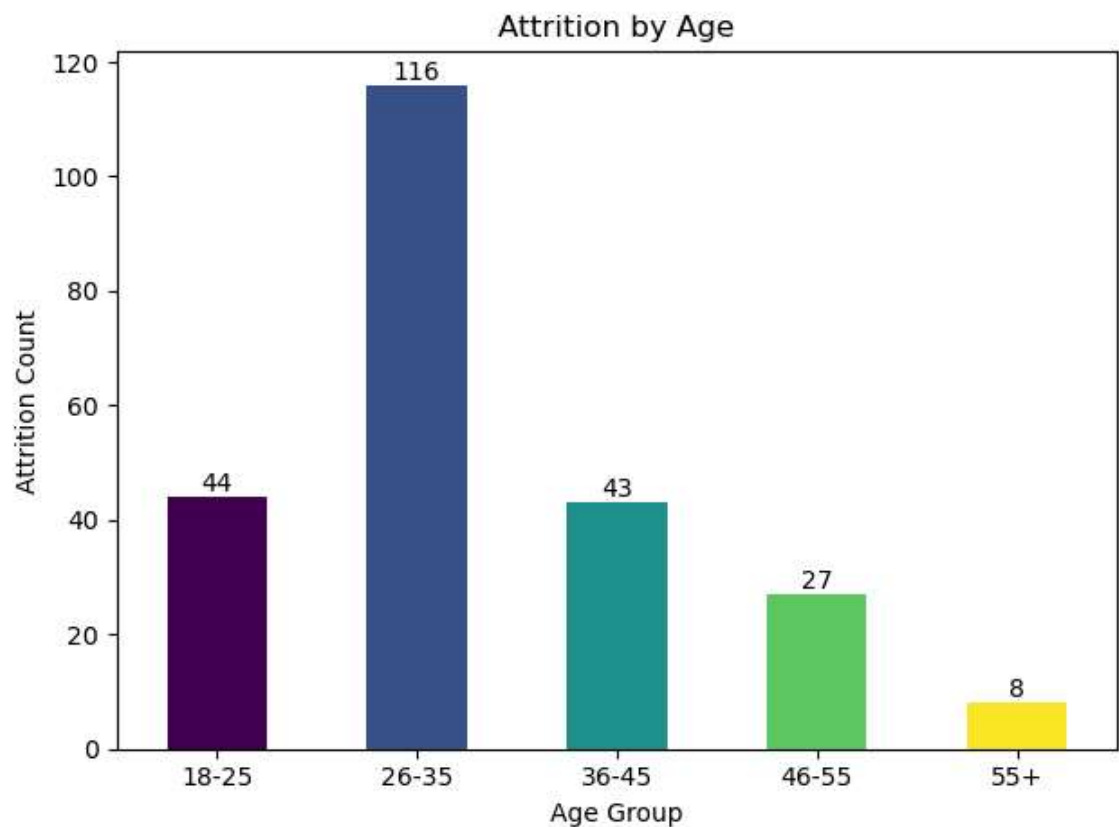
```
Out[57]: AgeGroup
18-25      44
26-35     116
36-45      43
46-55      27
55+         8
Name: AttritionCount, dtype: int64
```

```
In [151]: ▶ colors = plt.cm.viridis(np.linspace(0, 1, len(attrition_by_age)))

# Create a bar plot
attrition_by_age.plot(kind='bar',color=colors)

# Add count Labels on each bar
for i, count in enumerate(attrition_by_age):
    plt.text(i, count, str(count), ha='center', va='bottom')

plt.title('Attrition by Age')
plt.xlabel('Age Group')
plt.ylabel('Attrition Count')
plt.xticks(rotation=0) # Rotate x-axis labels
plt.tight_layout()
```



```
In [100]: ▶ attrition_by_salaryslab = df.groupby("SalarySlab")["AttritionCount"].sum
attrition_by_salaryslab.head()
```

```
Out[100]: SalarySlab
10k-15k      21
15k+         5
5k-10k       49
Upto 5k     163
Name: AttritionCount, dtype: int64
```

```

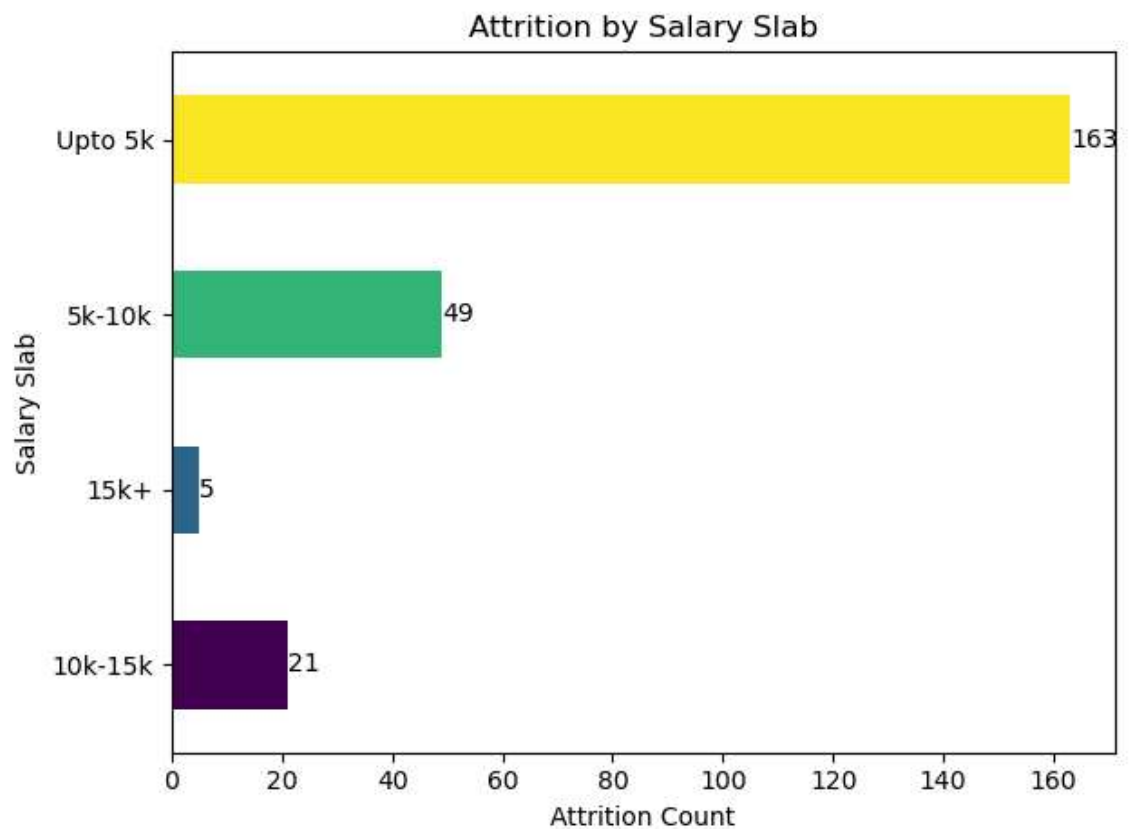
In [150]: ▶ colors = plt.cm.viridis(np.linspace(0, 1, len(attrition_by_salaryslab)))

# Create a bar plot
attrition_by_salaryslab.plot(kind='barh',color=colors)

# Add count Labels on each bar
for i, count in enumerate(attrition_by_salaryslab):
    plt.text(count, i, str(count), ha='left', va='center')

plt.title('Attrition by Salary Slab')
plt.xlabel('Attrition Count')
plt.ylabel('Salary Slab')
plt.xticks(rotation=0) # Rotate x-axis labels
plt.tight_layout()
plt.show()

```



```

In [147]: ▶ attrition_by_jobrole = df.groupby("JobRole")["AttritionCount"].sum().sort_values()
attrition_by_jobrole

```

```

Out[147]: JobRole
Laboratory Technician    62
Sales Executive           58
Research Scientist       47
Sales Representative      33
Name: AttritionCount, dtype: int64

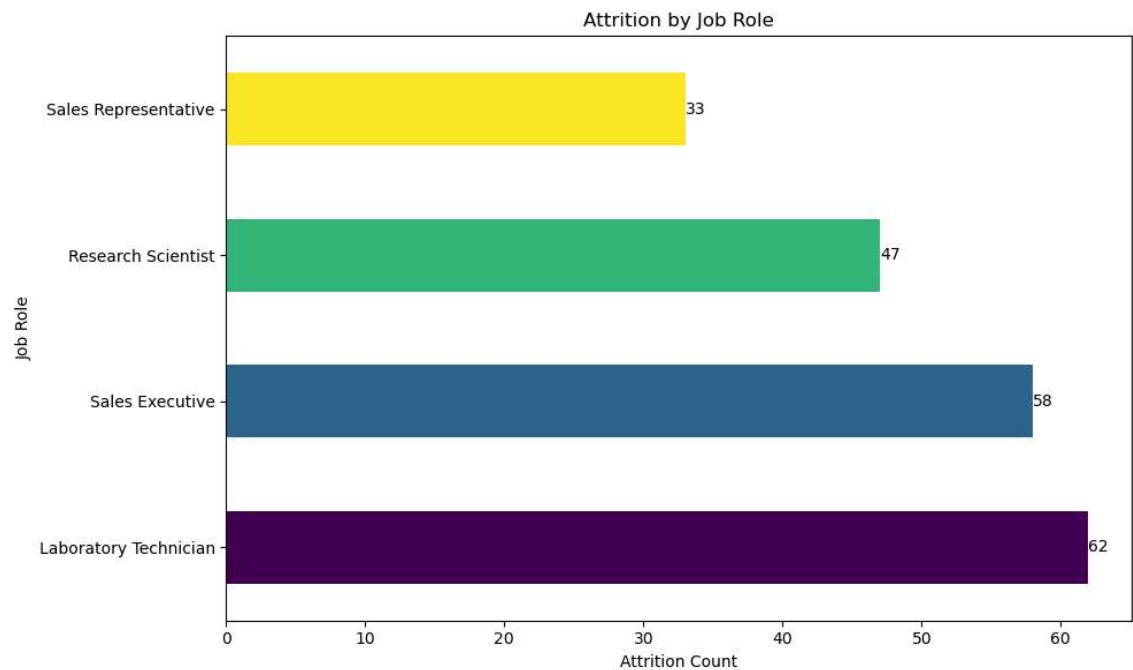
```

```
In [149]: ▶ colors = plt.cm.viridis(np.linspace(0, 1, len(attrition_by_jobrole)))

# Create a bar plot
plt.figure(figsize=(10, 6))
attrition_by_jobrole.plot(kind='barh', color=colors)

# Add count labels on each bar
for i, count in enumerate(attrition_by_jobrole):
    plt.text(count, i, str(count), ha='left', va='center')

plt.title('Attrition by Job Role')
plt.xlabel('Attrition Count')
plt.ylabel('Job Role')
plt.tight_layout()
plt.show()
```



```
In [157]: ▶ df["JobSatisfaction"].head()
```

```
Out[157]: 0    3
          1    3
          2    2
          3    4
          4    3
          Name: JobSatisfaction, dtype: int64
```

```
In [175]: ▶ attrition_by_satisfaction=df.groupby(["JobSatisfaction","JobRole"])["Attrition"]  
attrition_by_satisfaction
```


Out[175]:

	JobSatisfaction	JobRole	AttritionCount
0	1	Healthcare Representative	2
1	1	Human Resources	5
2	1	Laboratory Technician	20
3	1	Manager	1
4	1	Manufacturing Director	2
5	1	Research Director	0
6	1	Research Scientist	13
7	1	Sales Executive	17
8	1	Sales Representative	7
9	2	Healthcare Representative	2
10	2	Human Resources	2
11	2	Laboratory Technician	8
12	2	Manager	2
13	2	Manufacturing Director	2
14	2	Research Director	1
15	2	Research Scientist	10
16	2	Sales Executive	9
17	2	Sales Representative	10
18	3	Healthcare Representative	1
19	3	Human Resources	3
20	3	Laboratory Technician	21
21	3	Manager	1
22	3	Manufacturing Director	4
23	3	Research Director	1
24	3	Research Scientist	15
25	3	Sales Executive	18
26	3	Sales Representative	9
27	4	Healthcare Representative	4
28	4	Human Resources	2
29	4	Laboratory Technician	13
30	4	Manager	1
31	4	Manufacturing Director	2
32	4	Research Director	0
33	4	Research Scientist	9

	JobSatisfaction	JobRole	AttritionCount
34	4	Sales Executive	14
35	4	Sales Representative	7

```
In [192]: attrition_pivot = attrition_by_satisfaction.pivot(
            index='JobRole',
            columns='JobSatisfaction',
            values='AttritionCount'
        )
attrition_pivot['Total'] = attrition_pivot.sum(axis=1)

attrition_pivot_style = attrition_pivot.style.apply(
    lambda x: ['background: lightblue' if x.name == 'Total' else '' for
    )
attrition_pivot_style
```

Out[192]:

JobSatisfaction	1	2	3	4	Total
JobRole					
Healthcare Representative	2	2	1	4	9
Human Resources	5	2	3	2	12
Laboratory Technician	20	8	21	13	62
Manager	1	2	1	1	5
Manufacturing Director	2	2	4	2	10
Research Director	0	1	1	0	2
Research Scientist	13	10	15	9	47
Sales Executive	17	9	18	14	58
Sales Representative	7	10	9	7	33

```
In [196]: # Create a bar plot
plt.figure(figsize=(10, 6))
sns.barplot(data=attrition_by_satisfaction, x='JobRole', y='AttritionCount')
plt.title('Attrition by Job Satisfaction')
plt.xticks(rotation=90)
plt.tight_layout()
```

