Lab 11. Analysis of HR dataset

i) Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age.
ii) Create a Lollipop Chart to show the attrition rate based on gender category.
iii) Create a pie chart to show the attrition percentage based on Department Category.
iv) Create a bar chart to display the number of employees by Age group.
v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employee count
vi) Create a horizontal bar chart to show the attrition count for each Education field Education field wise attrition-drag education field to rows, sum attrition count to column.
vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group

Introduction

This program is designed to analyze and visualize an **HR dataset**. The primary objective is to extract meaningful insights about employees and their attributes such as attrition rates, demographics, education fields, job satisfaction, and more.

By leveraging interactive visuals like KPIs, bar charts, pie charts, and highlight tables, this program enables HR professionals to make data-driven decisions regarding workforce management and retention strategies.

The analysis covers key performance indicators (KPIs), gender-based attrition trends, department-wise attrition percentages, and job satisfaction levels across roles. Also, it provides age-group categorizations and attrition analysis for education fields, helping organizations understand workforce trends comprehensively.

Introduction to the Dataset

The dataset represents a **HR database** containing details about employees, their roles, demographics, and employment status. It is structured to capture critical information about employees to facilitate workforce analysis and meet the requirements of the visualizations specified.

Description of the Dataset

- **EmployeeID**: A unique identifier for each employee (1 to 50).
- **Name**: Employee names, reflecting a mix of Indian male and female names for diversity.
- **Age**: The age of employees, ranging from 25 to 50 years.
- **Gender**: The gender of employees, categorized as either Male or Female.
- **Department**: The department in which employees work, including IT, HR, Sales, Finance, and Operations.
- **EducationField**: The educational background of employees, such as Computer Science, Human Resources, Marketing, etc.
- **JobRole**: The specific role of the employee, e.g., Software Engineer, HR Manager, Data Analyst, etc.
- **JobSatisfaction**: A rating (1 to 5) representing job satisfaction, where 1 is the lowest and 5 is the highest.
- **Attrition**: Indicates whether the employee has left the organization (Yes) or is still active (No).
- **AgeGroup**: Categorized age ranges (e.g., 25-30, 30-35) for grouping employees by age.

EmployeeID	Name	Age	Gender	Department	EducationField	JobRole	JobSatisfaction	Attrition	AgeGroup
1	Aarav Sharma	28	Male	IT	Computer Science	Software Engineer	4	Yes	25-30
2	Ananya Gupta	34	Female	HR	Human Resources	HR Manager	3	No	30-35
3	Aditya Verma	29	Male	IT	Computer Science	Developer	2	No	25-30
4	Priya Nair	40	Female	Sales	Business Management	Sales Executive	5	Yes	40-45
5	Rajesh Singh	50	Male	Operations	Engineering	Operations Head	4	No	45-50
6	Kavya Mehta	27	Female	IT	Computer Science	Data Analyst	3	Yes	25-30
7	Arjun Iyer	32	Male	Finance	Accounting	Accountant	4	No	30-35
8	Ishita Roy	38	Female	IT	Computer Science	Project Manager	5	Yes	35-40
9	Rahul Pandey	26	Male	IT	Computer Science	Developer	2	No	25-30
10	Sneha Pillai	44	Female	HR	Human Resources	HR Executive	3	Yes	40-45
11	Aman Kumar	31	Male	IT	Information Systems	Systems Analyst	3	No	30-35
12	Pooja Sharma	45	Female	Operations	Business Management	Operations Manager	4	No	45-50
13	Vikas Jain	37	Male	Sales	Marketing	Marketing Manager	5	Yes	35-40
14	Nisha Aggarwal	29	Female	Finance	Commerce	Financial Analyst	3	No	25-30
15	Suresh Reddy	42	Male	Operations	Engineering	Operations Manager	4	No	40-45
16	Riya Sen	28	Female	HR	Human Resources	HR Coordinator	3	Yes	25-30
17	Manish Kapoor	35	Male	IT	Computer Science	Software Developer	5	Yes	35-40
18	Aditi Mishra	30	Female	IT	Information Systems	IT Specialist	4	No	30-35
19	Kunal Das	39	Male	Sales	Business Management	Sales Manager	5	Yes	35-40
20	Meera Nambiar	48	Female	Operations	Engineering	Operations Head	4	No	45-50

Objectives of the Program

1. Calculate key workforce metrics like total employee count, attrition count, attrition rate, and average age.
2. Analyze attrition trends by gender, department, age group, and education field.
3. Display job satisfaction levels across job roles to identify engagement patterns.
4. Segment employees by demographics such as age groups and gender for deeper insights.
5. Create interactive visualizations for dynamic data exploration and filtering.

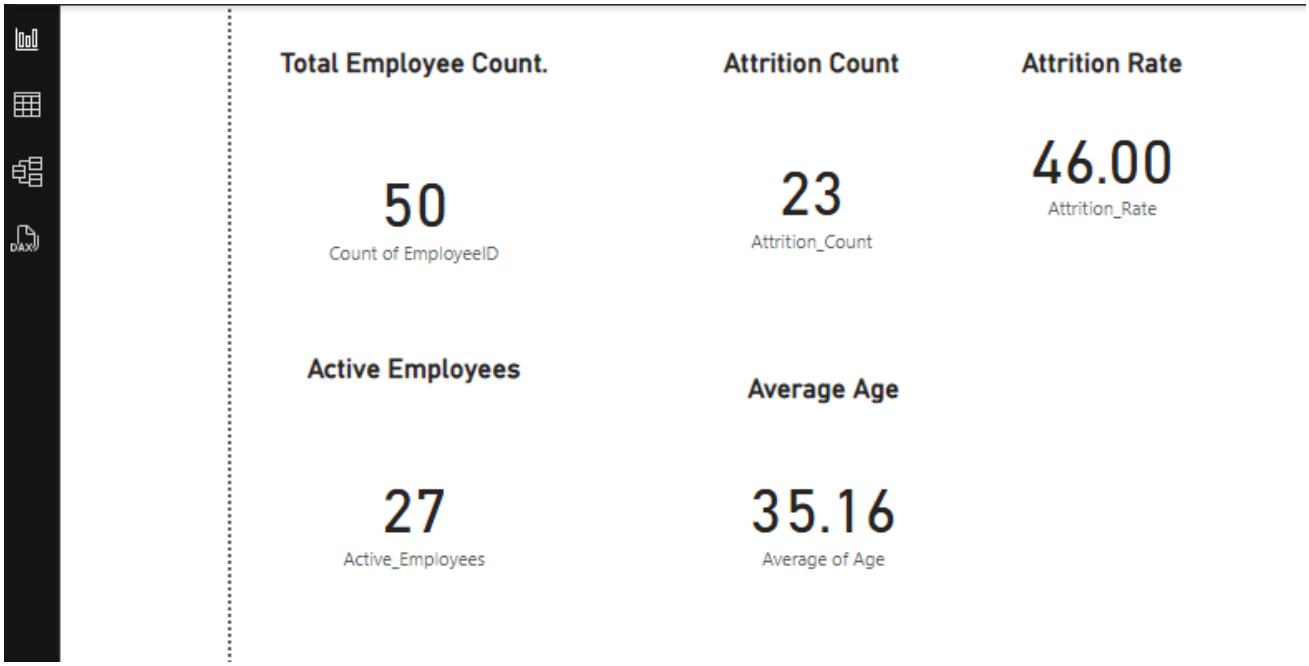
i) Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age.

KPI (Key Performance Indicator) is a measurable value that demonstrates how effectively an individual, team, or organization is achieving a business objective. KPIs are used to evaluate the success of an organization or a specific activity in which it engages.

Visually distinct KPIs displaying-

- Total Employee Count
- Attrition Count
- Attrition Rate
- Active Employees
- Average Age

KPI Dashboard



(i) Total Employee Count

1. Select the **Card Visual** in the Visualizations pane.
2. In the **Fields** pane:
    - Drag the EmployeeID to the **Fields** section.
    - Change the aggregation to **Count** (click on the dropdown arrow next to EmployeeID in the Values field).
3. Rename the card title to **Total Employee Count**:

- Go to **Format Visual ->Title**, enable it, and type the title **Total Employee Count.**

(ii) Attrition Count (Attrition is when employees leave an organization)

1. click **New Measure**.
2. Enter the following DAX formula:

DAX

```
Attrition_Count = COUNTX(FILTER('HR', 'HR'[Attrition] = "Yes"), 'HR'[EmployeeID])
```

a. *FILTER('HR', 'HR'[Attrition] = "Yes")*

- **What it does**:
    - The FILTER function creates a new table by applying a condition.
    - In this case, it filters the HR table to include only rows where the Attrition column equals "Yes".
- **Result**:
    - A smaller virtual table containing only employees who have left the organization.

b. *COUNTX(FILTER, 'HR'[EmployeeID])*

- The COUNTX function iterates over a table (in this case, the filtered table created by FILTER) and counts the non-blank values in the specified column (EmployeeID).
- Each employee has a unique EmployeeID. By counting these IDs in the filtered table, we get the total number of employees who have left.

3. Add a new **Card Visual** to the canvas.
4. Drag the **Attrition Count** measure into the card.
5. Rename the card title to **Attrition Count**.

(iii) Attrition Rate

1. click **New Measure**.

Enter the following DAX formula:

This calculates the attrition rate as a percentage of total employees.

```
Attrition_Rate = DIVIDE([Attrition_Count],COUNT('HR'[EmployeeID]), 0) * 100
```

2. Press **Enter**.
3. Add a **Card Visual** to the canvas.
4. Drag the **Attrition Rate** measure into the card. Rename the card title to **Attrition Rate**.

- The formula calculates the **Attrition Rate** as a percentage, showing the proportion of employees who have left the organization compared to the total number of employees.
- if the denominator (COUNT('HR'[EmployeeID])) is zero, it returns the third argument (in this case, 0), avoiding runtime errors.
- Multiplies the result of the division by 100 to convert it into a percentage.

(iv) Active Employees

1. click **New Measure**.
2. Enter the following DAX formula:

```
Active_Employees = COUNTX(FILTER('HR', 'HR'[Attrition] = "No"), 'HR'[EmployeeID])
```

3. Press **Enter**.
4. Add a **Card Visual** to the canvas.
5. Drag the **Active Employees** measure into the card.
6. Rename the card title to **Active Employees**.

(v) Average Age

1. Add a new **Card Visual** to the canvas.
2. Drag the Age column into the card.
3. Power BI will display the default aggregation as **Sum**.
4. Change the aggregation: Click on the dropdown arrow next to Age in the Values field and select **Average**.
5. Rename the card title to **Average Age**.

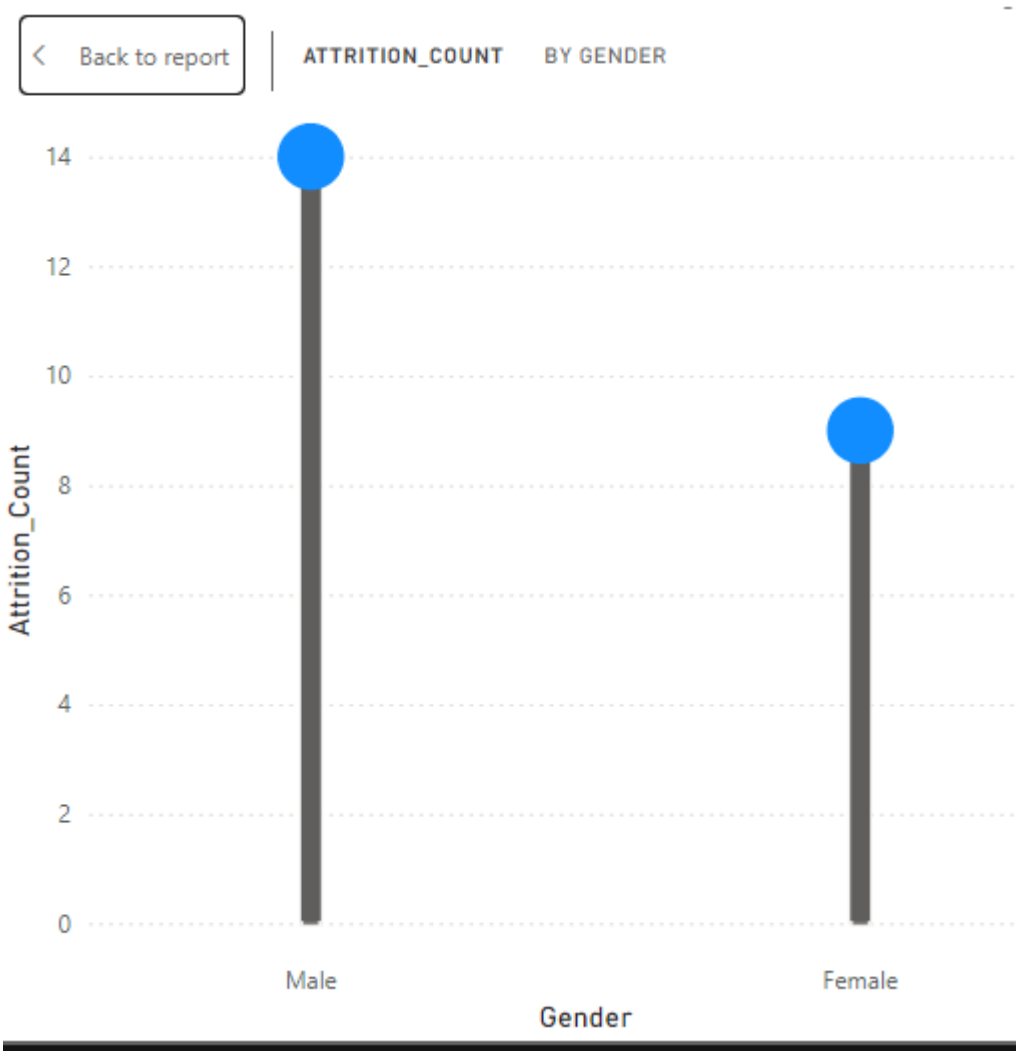
ii) Create a Lollipop Chart to show the attrition rate based on gender category.

Lollipop Chart

A **Lollipop Chart** is a variation of a bar chart that uses a line (or stick) with a circular marker (the lollipop) to represent data points. It's often used to emphasize individual data points in a clean, visually appealing way. It's similar to a bar chart but offers better clarity, especially when you want to emphasize data values without crowding the visualization with long bars.

In a **Lollipop Chart**, the line represents the magnitude of a metric (such as attrition rate), and the marker at the end of the line represents the actual value. This visualization is particularly effective for showing comparisons across different categories.

Steps to Create a Lollipop Chart to Show Attrition Rate by Gender



Since Lollipop Chart is not available on Desktop version of powerBI, we shall use Line Chart to create the Lollipop Chart.

1. Select the Line chart:
2. Drop Gender to X-Axis well and Attrition Count to Y-Axis well.
3. Go to Markers-> Enable **show for all categories**-> Change the shape to **Bullet->** Increase its size to **20 px.** Now the size of the data point would be increased indicating the head of the Lollipop for the Lollipop chart.
4. Now to connect a line from X-Axis to the data point (Indicating the Lollipop stick),

- Go to Error Bars-> Make sure the Options Enabled to ON
- Drop Attrition_Count to Upper bound well.
- Create a new measure LB and set it to 0 i.e LB=0 and add this to Lower bound well.
- Under the same Options Enabled-> Bar(ON)->Width is 10 PX, indicating the stick of the Lollipop for the chart.

5. To disconnect the lines joining the data points:

   Go to Lines-> Line-> Width-> set to 0 PX.

iii) Create a pie chart to show the attrition percentage based on Department Category.

Create a Pie Chart to Show Attrition Percentage by Department

A **Pie Chart** is an effective way to visualize proportional data. In this case, we'll use it to display the attrition percentage across different departments, helping to identify which department contributes the most to employee attrition.

Step-by-Step Guide to Create the Pie Chart

Step 1: Add a Pie Chart

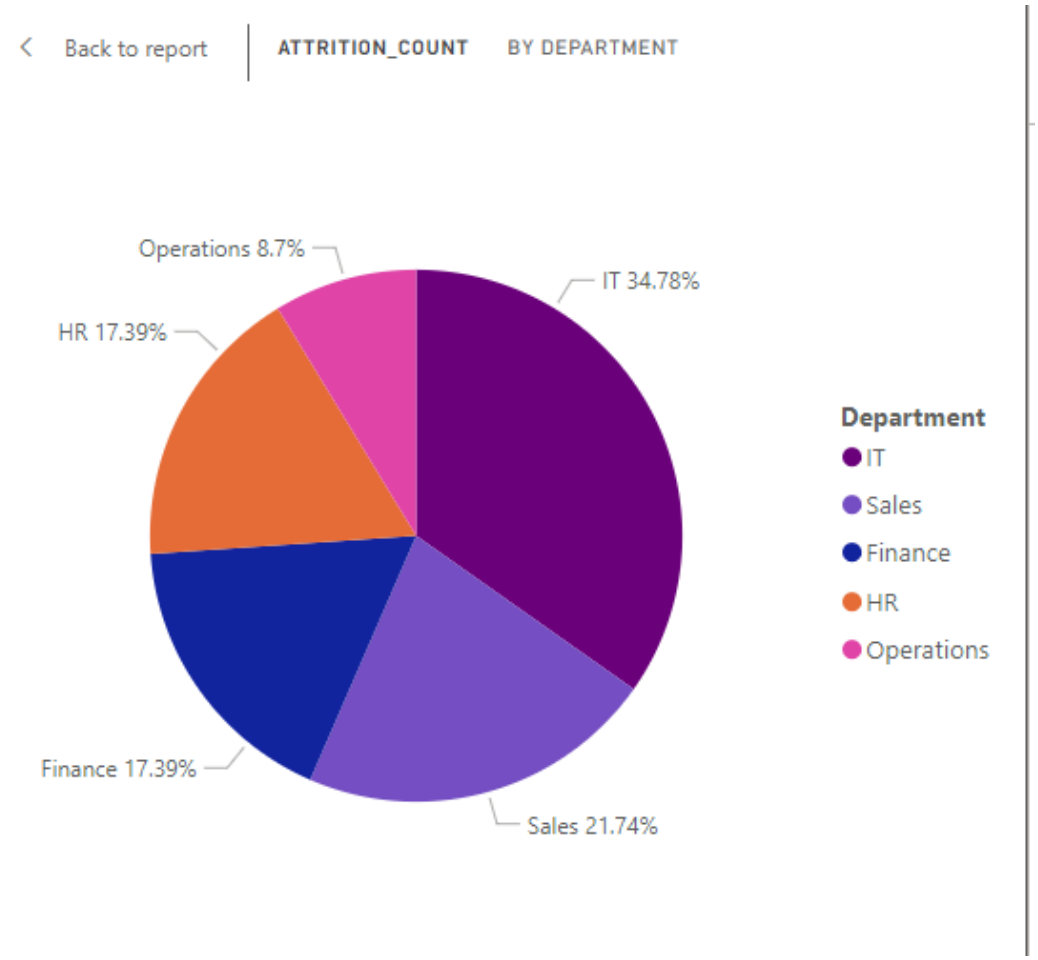
1. **Select the Pie Chart Visual**:
   - Click on the **Pie Chart** icon.

Step 2: Set Data Fields

1. **Add Department to the Legend**:

- Drag the Department column into the **Legend** field well of the pie chart.
- This will create a separate slice in the pie chart for each department in the dataset.

2. Drag the **Attrition_Count** measure into the **Values** field of the pie chart.



iv) Create a bar chart to display the number of employees by Age group.

1. **Add a Bar Chart**:

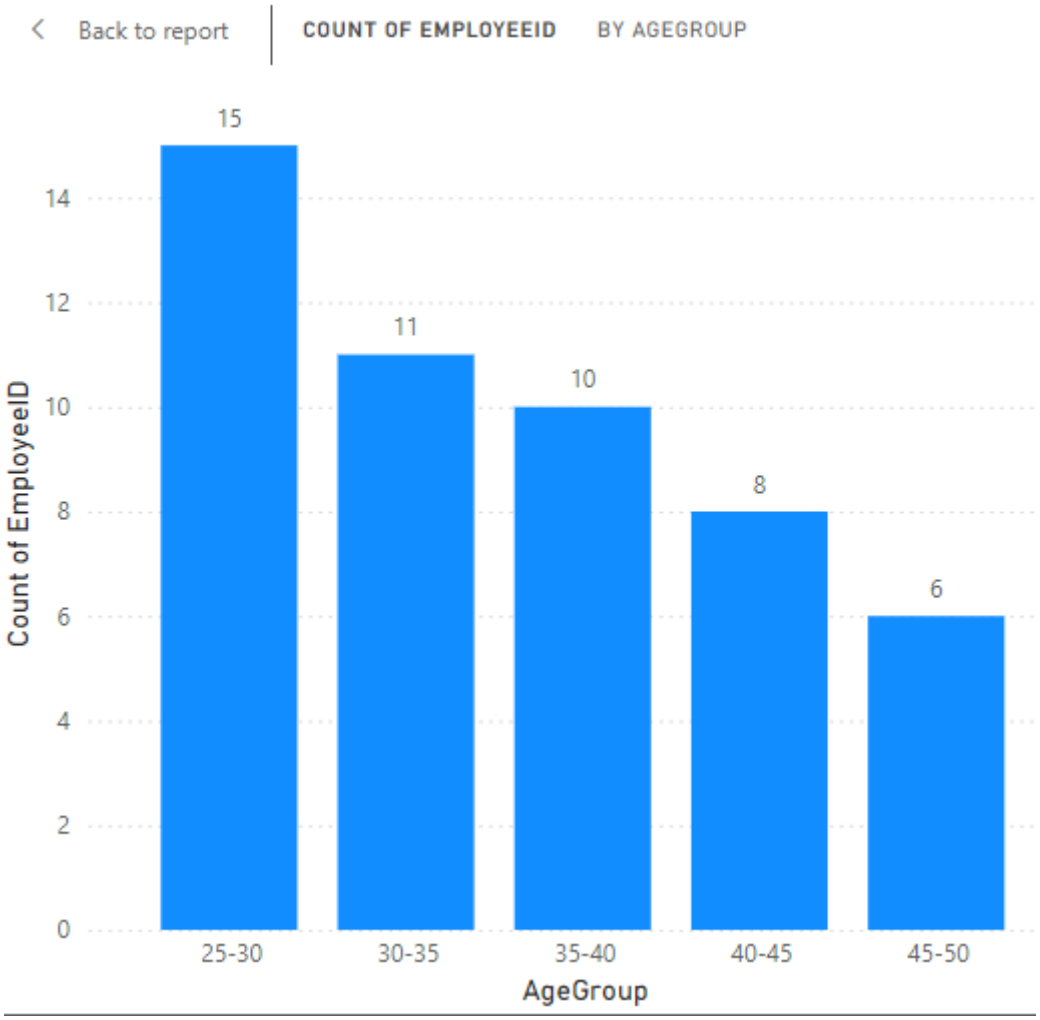
   - Select the **Clustered Bar Chart** visual.

2. **Set Data Fields**:

   - Add **AgeGroup** to the X-**Axis**.
   - Add **EmployeeID** to the **Y-Axis** field and set aggregation to **Count**.

3. **Format Chart**:

Add Data Labels to display the employee count: Data Labels: ON



v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employee count.

A **highlight table** in Power BI is a variation of a matrix or table visualization, where the values are visually emphasized with colors based on their magnitude.

Steps to Create the Highlight Table

1. **Add a Matrix Visual**:

- In the **Visualizations Pane**, select the **Matrix Visual**.

2. **Set Data Fields**:

i. **Rows**: Drag the Job Role field to the **Rows** field.

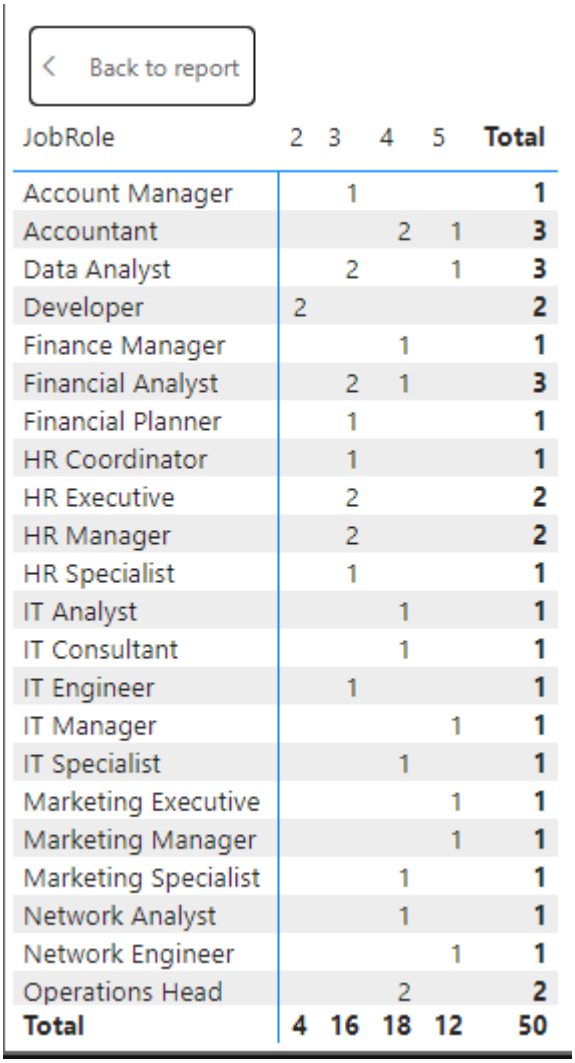
- This will create a row for each unique job role.

ii. **Columns**: Drag the Job Satisfaction field to the **Columns** field.

- This will create a column for each level of job satisfaction (e.g., 1, 2, 3, 4, 5).

iii. **Values**: Drag the EmployeeID field to the **Values** field.

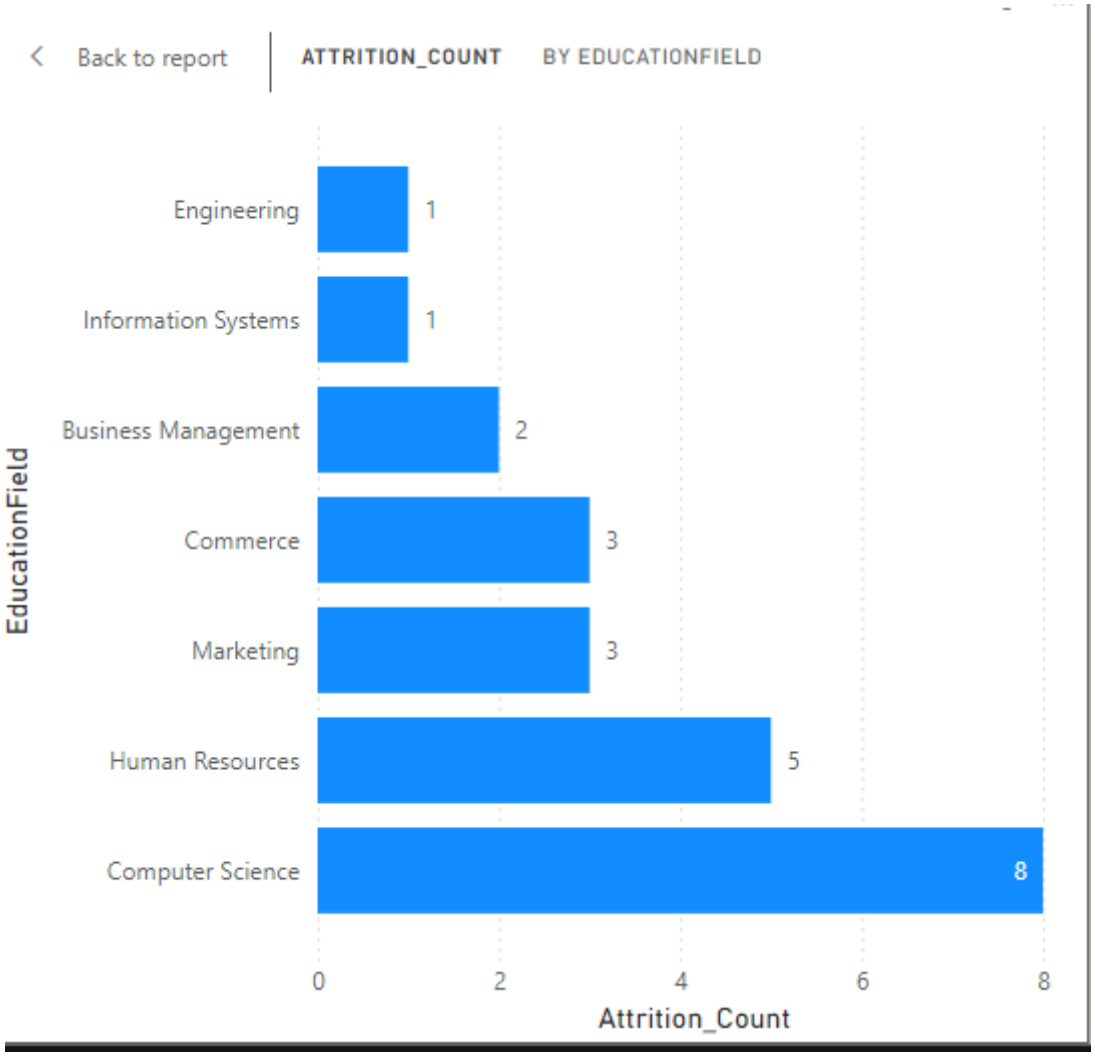
- Set the aggregation to **Count**. This will count the number of employees for each combination of job role and job satisfaction rating.



JobRole	2	3	4	5	Total
Account Manager		1			**1**
Accountant			2	1	**3**
Data Analyst		2		1	**3**
Developer	2				**2**
Finance Manager			1		**1**
Financial Analyst		2	1		**3**
Financial Planner		1			**1**
HR Coordinator		1			**1**
HR Executive		2			**2**
HR Manager		2			**2**
HR Specialist		1			**1**
IT Analyst			1		**1**
IT Consultant			1		**1**
IT Engineer		1			**1**
IT Manager				1	**1**
IT Specialist			1		**1**
Marketing Executive				1	**1**
Marketing Manager				1	**1**
Marketing Specialist			1		**1**
Network Analyst			1		**1**
Network Engineer				1	**1**
Operations Head			2		**2**
Total	**4**	**16**	**18**	**12**	**50**

vi) Create a Horizontal Bar Chart to Show the Attrition Count for Each Education Field

A horizontal bar chart is ideal for comparing values across categories. Here, it will show the attrition count grouped by different education fields.



Steps to Create the Horizontal Bar Chart

1. **Add a Clustered Bar Chart**:

- Select the **Clustered Bar Chart**.

2. **Set Data Fields**:

    - Drag **Education Field** to the **Y-axis** (Categories).
    - Drag **Attrition Count** to the **X-axis** (Values).

3. **Format the Chart**:

- **Sort by Values**: Click on the ellipsis (three dots) in the visual and choose **Sort by Attrition Count** in descending order to arrange bars from largest to smallest.
- **Enable Data Labels**:
    - Go to the **Format Pane** and turn on **Data Labels**.
    - This displays the attrition count directly on the bars.

vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group

Steps to Create Multiple Donut Charts for Attrition Rate by Gender for Different Age Groups

Step 1: Set Up the Data Fields

1. **Donut Chart Visualization**:
    - Go to the **Visualizations Pane** in Power BI.
    - Select the **Donut Chart** icon to create a donut chart.
2. **Set the Data Fields**:
    - **Legend (Categories)**: Drag the **Gender** field from your dataset into the **Legend** field well. This will split the donut chart by gender (e.g., Male, Female)
    - **Values**: Drag the **Attrition Rate** measure (the one you created earlier) into the **Values** field well.
    - This will represent the **attrition rate** as a proportion for each gender category.
3. **Apply Filters for Age Group**:
    - **Age Group Filter**: To show attrition rates for specific age groups, drag the **Age Group** field into the **Filters pane**
    - This will allow you to filter the donut chart by age group.

Step 2: Duplicate the Donut Chart for Each Age Group

1. **Duplicate the Donut Chart**:
    - After setting up one donut chart, you can **duplicate** it to create separate charts for each **Age Group**.

- To duplicate, select the chart and press **Ctrl + C** (copy) and **Ctrl + V** (paste), or simply use **Right-click > Duplicate**.

2. **Set Filters for Each Age Group**:

   - For each duplicated donut chart, you need to filter it to show the **Attrition Rate** for a specific **Age Group**.

   - For example:
     - For the first chart, set the **Age Group** filter to **25-30**.
     - For the second chart, set the **Age Group** filter to **30-35**, and so on.

3. **Apply the Filter**:

   - Click on the donut chart.
   - In the **Filters** pane, drag the **Age Group** field to the **Filters on this visual** section.
   - Select the appropriate **Age Group** (e.g., **25-30**, **30-35**, etc.) for each chart.

Step 3: Format the Donut Chart

Once you have the donut charts set up for each age group, follow these formatting steps to make them visually appealing:

1. **Data Labels**:

   - Go to the **Format Pane** (paint roller icon).
   - Under **Data labels**, toggle **On**.
     - Detail Labels-> Options-> Label Contents-> Select Category, Percentage from the Drop Down list.

- This will display the Category (Male and Female), Percentage as percentages on the donut slices.