IFT 598: Data Visualization & Reporting for IT

Project - Phase III: Dashboard Implementation

Topic: Employee Attrition & Performance, IBM

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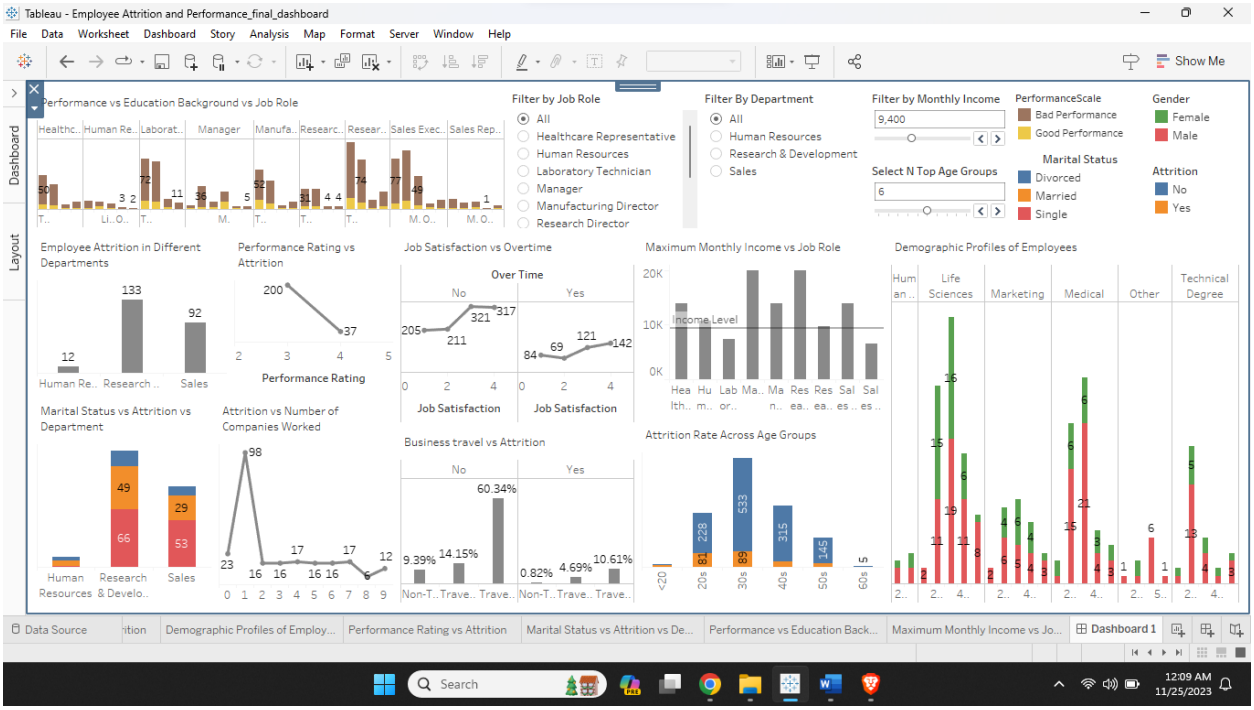
“Section 1: The Dashboard”



The HR-Employee-Attrition is the dataset utilized in the dashboard mentioned earlier. The dashboard effectively presents a visual representation of all the questions listed in the project by incorporating labels and colours to highlight crucial points. The dashboard provides valuable insights into employee attrition and performance and its potential contributing factors. This dashboard has multiple sheets which covers topics like employee attrition in different departments, employee performance, Monthly income vs attrition, job satisfaction vs working overtime by employees, business travel by employees and how it is affecting towards attrition, etc. This dashboard also has user interactivity features like filters, parameters, reference lines which makes the dashboard easy to visualize and gives a chance to user to change the data dynamically.

“Section 2: The Dataset”

“Dataset Description”

The Employee Attrition & Performance dataset offers an all-inclusive set of data about workers in a business, including details about their work history, performance indicators, and demographics. The dataset is specifically made to make it easier to analyze the variables that affect employee attrition, or when workers leave the organization, and to learn more about characteristics that are linked to performance. It contains data on the age, gender, and marital status of the workforce as well as work-related information like department, job positions, and the frequency of business travel. It also has metrics on work-life balance, overall performance, and job satisfaction. For HR professionals, analysts, and organizational leaders looking to better understand workforce dynamics, spot trends that affect attrition, and put strategic plans into action to boost employee happiness and retention, this dataset is a great resource.

“Column Data Types:”

Age - Ratio

Attrition - Categorical

BusinessTravel - Categorical

DailyRate - Interval

Department - Categorical

DistanceFromHome - Ratio

Education - Ordinal

EducationField - Categorical

EmployeeNumber - Ratio

EnvironmentSatisfaction - Ordinal

Gender - Categorical

HourlyRate - Interval

JobInvolment - Ordinal

JobLevel - Ordinal

JobSatisfaction - Ordinal

JobRole - Categorical

MonthlyIncome - Interval

OverTime - Categorical

MaritalStatus - Categorical

PercentSalaryHike - Interval

PerformanceRating - Ordinal

RelationshipSatisfaction - Ordinal

TotalWorkingYears - Ratio

WorkLifeBalance - Ordinal

YearAtCompany - Ratio

“Data Preparation & Pre-processing”

To generate data visualizations for the Employee attrition and performance dataset, the data must first be prepared and pre-processed. This include identifying any sections that require adjustment, resolving any problems, and correctly formatting raw data.

Preparing and pre-processing data involves the following steps:

- Import the dataset into Tableau first by obtaining it from Kaggle.
- An important step in data preparation is to look for null values and, if found, either remove them or replace them with the appropriate information.
- In the dataset, we also performed data categorization, including age groupings into <20, 30s, 40s, 50s, and 60s.
- We have created calculated fields for age groups and performance ratings of the employees, such that we can implement those attributes in our visualizations.
- Finally, we chose Tableau because of its user-friendly interface and speedy data visualization capabilities, even if Python may be used for pre-processing data.

“Section 3: Dashboard Users”

1. **Department of Human Resources (HR)**: With this dashboard, HR experts may track and analyze trends in employee attrition over time. This entails identifying patterns, comprehending the causes of attrition across time, and projecting the likelihood of attrition in the future.

2. **Supervisors and Group Heads**: To ascertain whether any issues need to be solved, they might examine the dashboard and the attrition rates of the teams they oversee. They can

also use it to manage their workers by organizing meetings and identifying areas that could require additional attention in areas like retention or recruitment.

3. **Chief Executives and Higher Management:** For leaders present at a higher level of the organization, the dashboard offers a great summary of attrition. Having this information may help a company expand in several ways by enabling them to make better decisions about the allocation of resources, strategic hiring, and other areas. It also helps them understand the present status of the workforce.

4. **Employee Training and Development Teams:** Teams within an organization that oversee staff development and employee training may use the dashboard to assess where they fall short in any area of professional development or training that could lead to a higher percentage of employee turnover. They may thus develop unique training programs that can aid in raising the rate of employee retention by studying this data.

5. **Legal and Compliance teams:** The dashboard may be used by legal and compliance teams to ensure that the business is abiding by all employment rules and regulations. They may also keep an eye on whether all employee rights are being met and handle attrition patterns, which can help identify any legal risk hotspots.

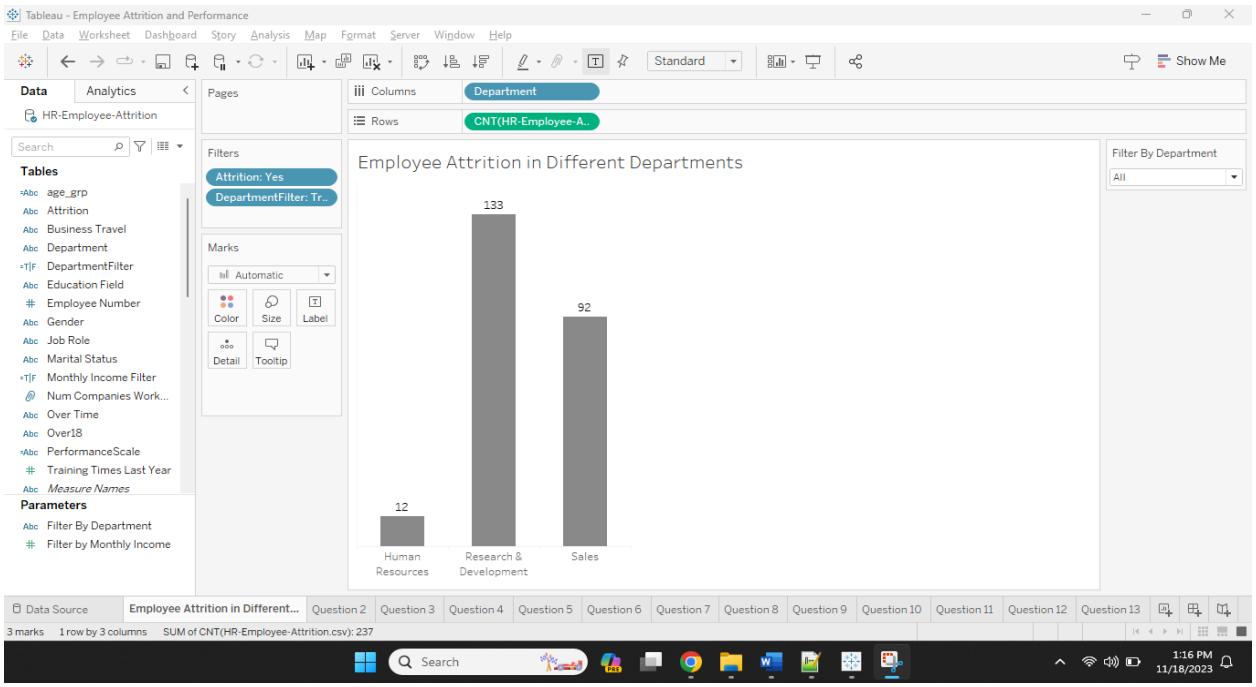
"Section 4: Questions"

1. How many employees have attrition in a particular department?
2. How was the attrition rate varying across different age groups?
3. How was the attrition rate depending on number of companies worked by an employee?
4. Is there any correlation between employee job satisfaction and employee working overtime?

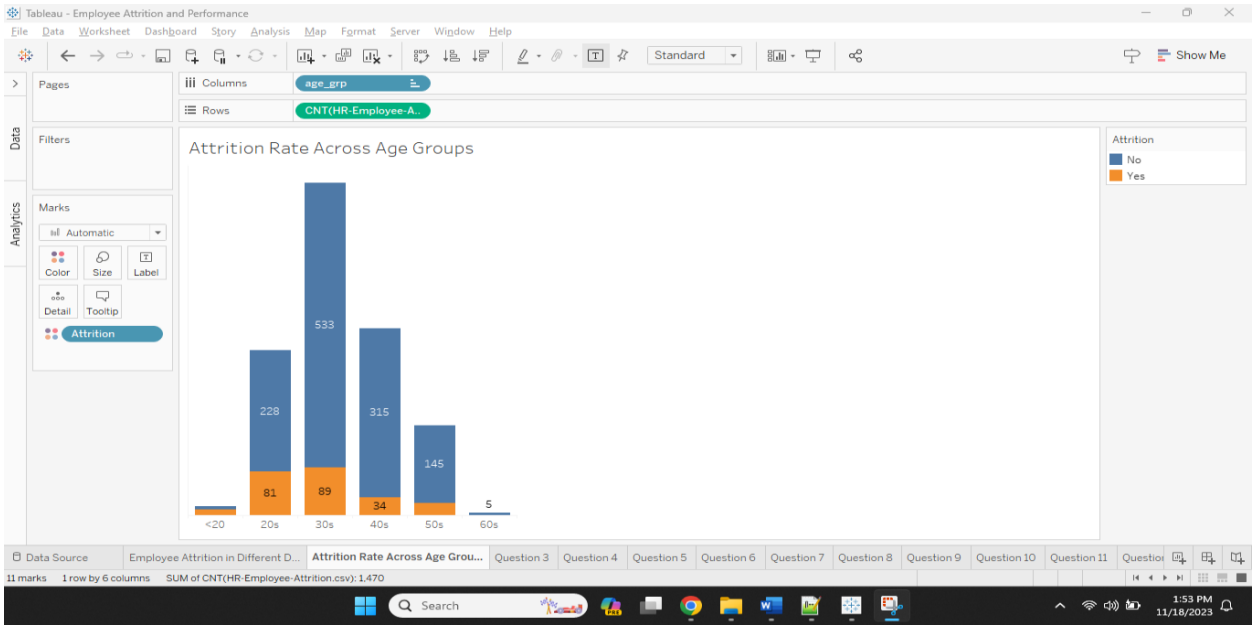
5. Is there any relation between business travel and attrition?
6. What is the demographic profile of employees who have left, considering factors like age, gender, and education?
7. Explain how was the performance rating for employees who had attrition?
8. How many employees have left the company from each department and group them according to their marital status?
9. Explain how employees from different education backgrounds are performing in their job roles?
10. Find the maximum monthly income in each job role and provide a reference line to user for easy analysis.

“Section 5: Plots”

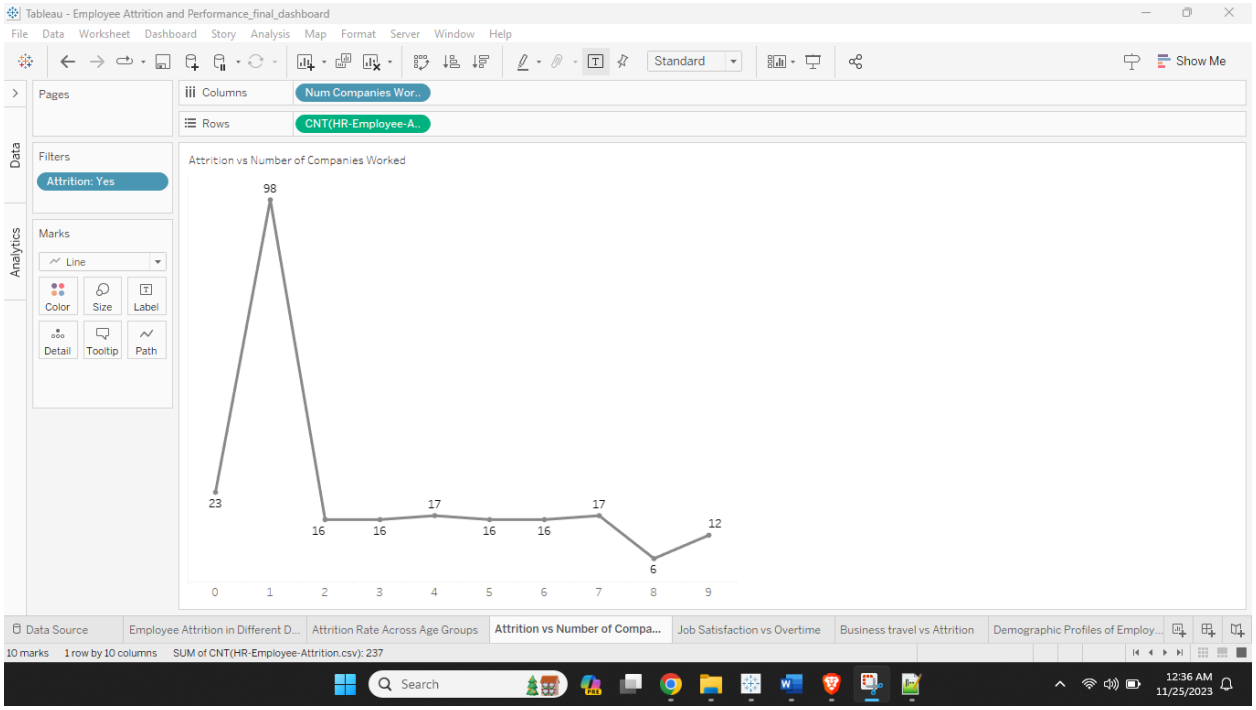
1. To visually show the number of employees who left different departments, a bar chart was used. The various departments are displayed on the x-axis, while the number of attrition-affected personnel is displayed on the y-axis. As a result of data-ink maximization, the bars are shown in grayscale. In this visualization, the length property serves as a pre-attentive attribute.



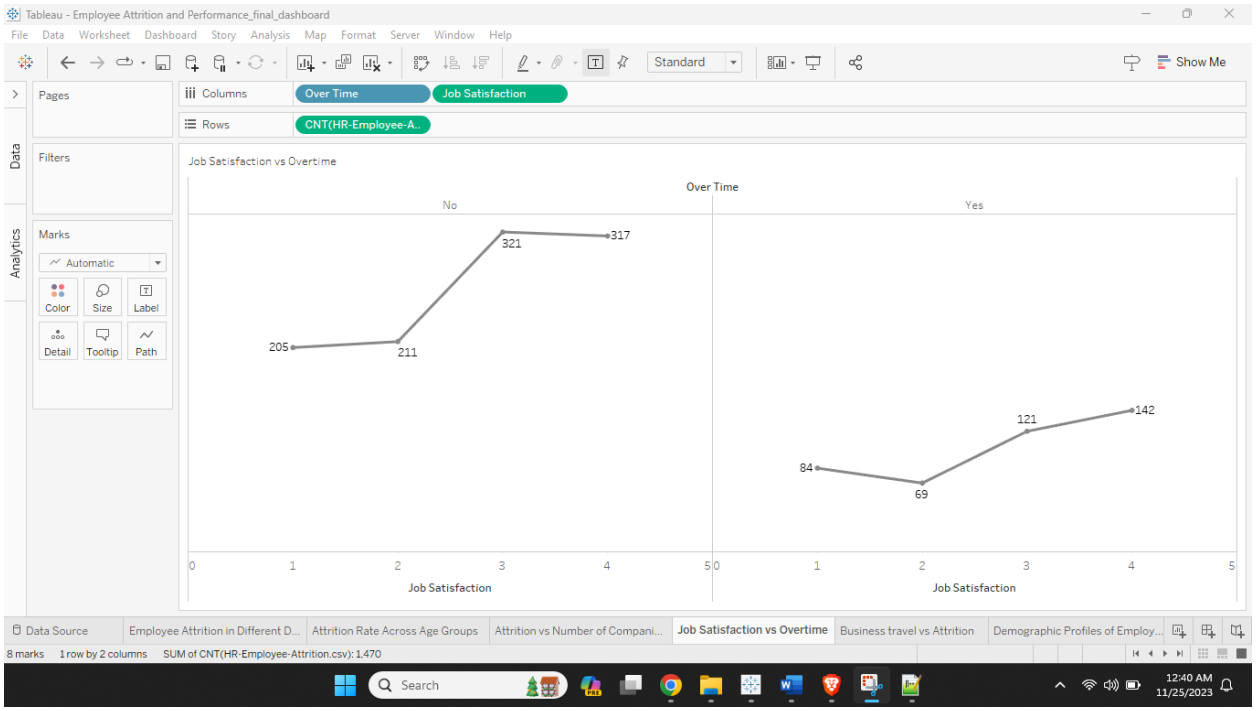
2. A stacked bar chart was used to represent attrition rate across different age groups. For this visualization, we had grouped the ages using calculated field feature. The y-axis shows number of employees, while the x-axis displays the age groups. In this stacked bar chart orange colour represents employees who had attrition and blue colour represents employees who did not had attrition. In this visualization, the length property serves as a pre-attentive attribute.



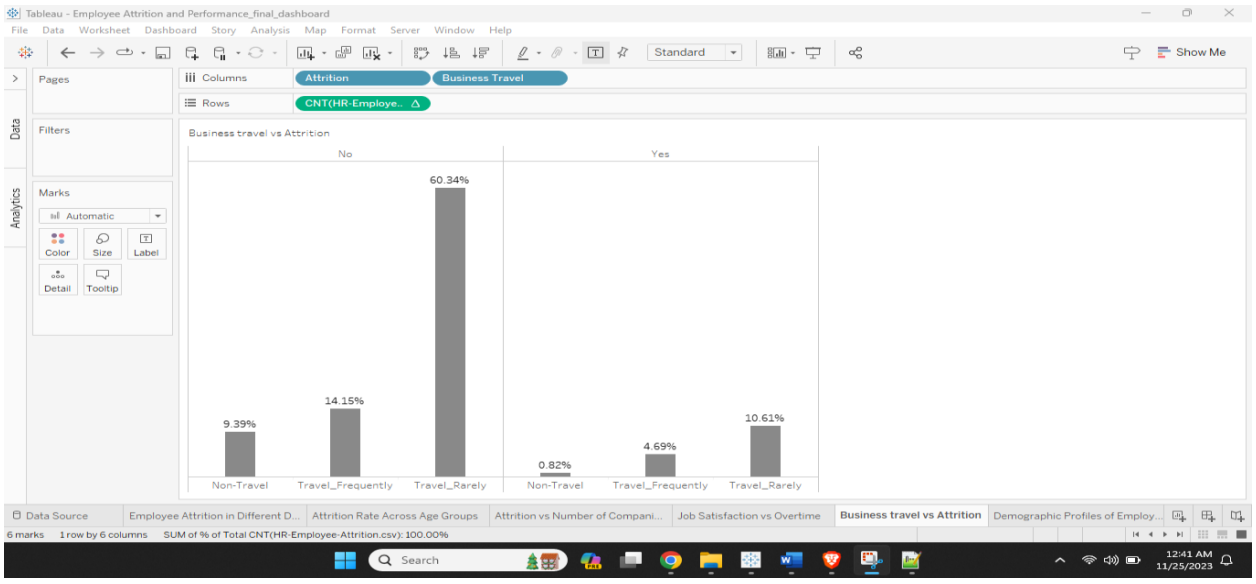
3. A line chart was used to represent the attrition rate depending on the number of companies worked by an employee, the y axis shows occurrences of employees where attrition happens to be true and x axis shows the count of companies. The pre attentive attribute used here is position through which the underlying patterns of employee attrition trends can be examined



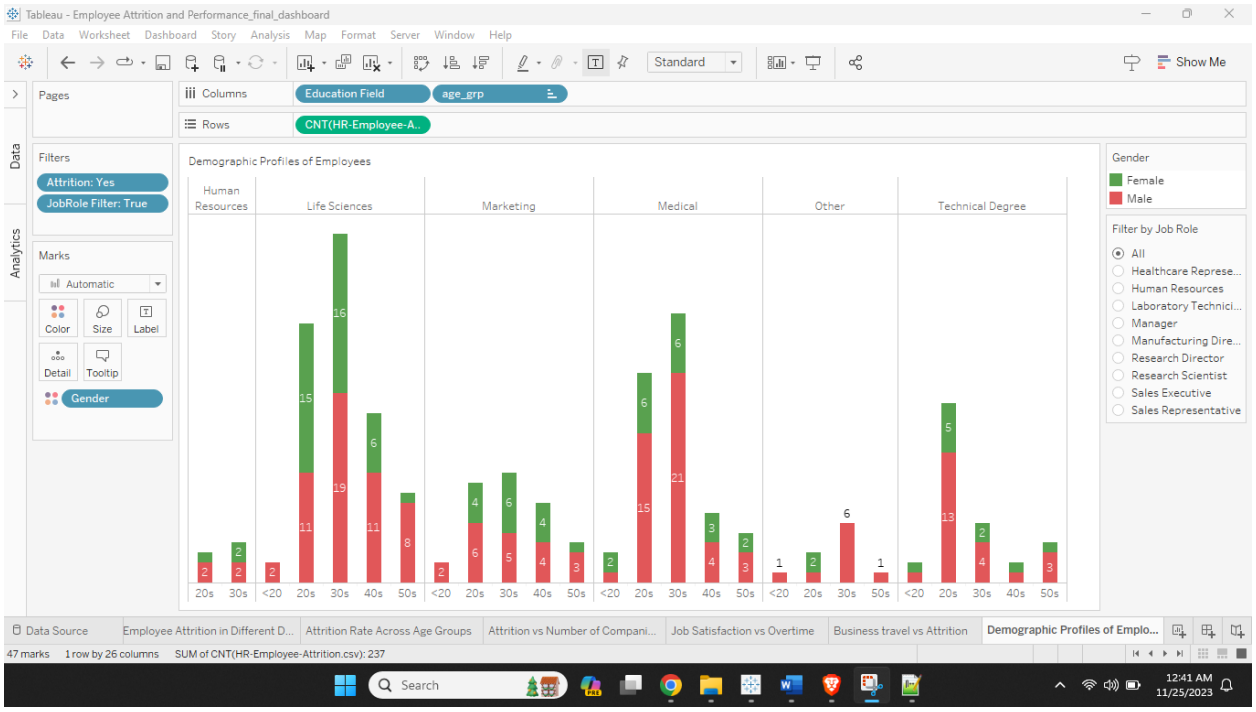
4. The below graph represents the correlation existing between employee job satisfaction and if they are working overtime or not, the y axis shows if employee works overtime or not and x axis shows the job satisfaction rate on a scale of 1 to 5 it can be clearly deducted from the graph that the employee who have worked overtime tend to have higher job satisfaction rates.The pre-attentive attribute here is the position.



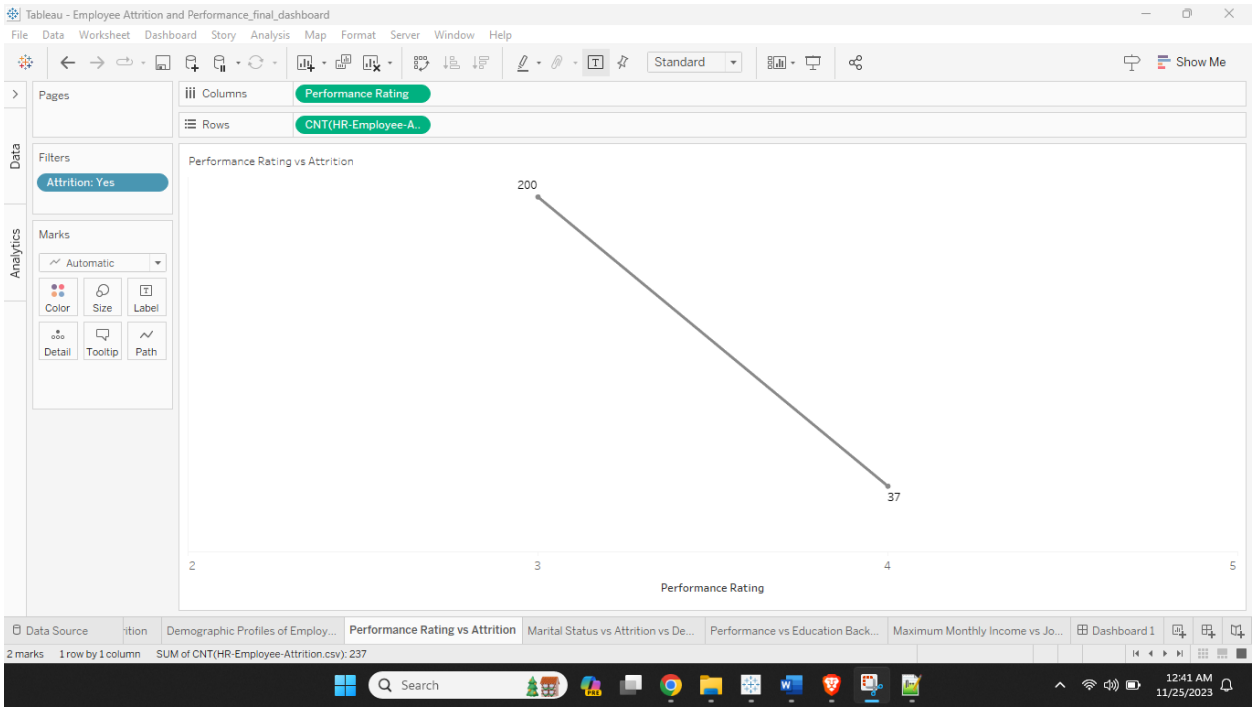
5. The figure below represents a stack bar chart that shows the relation between the business travel history of an employee and if their attrition appears be to be true or false. It can be seen that percent labels that are shown in the graph depicts the amount of population of a particular category and it attrition status i.e true or false compared to the total population the entire dataset. Pre-attentive attribute used here is length.



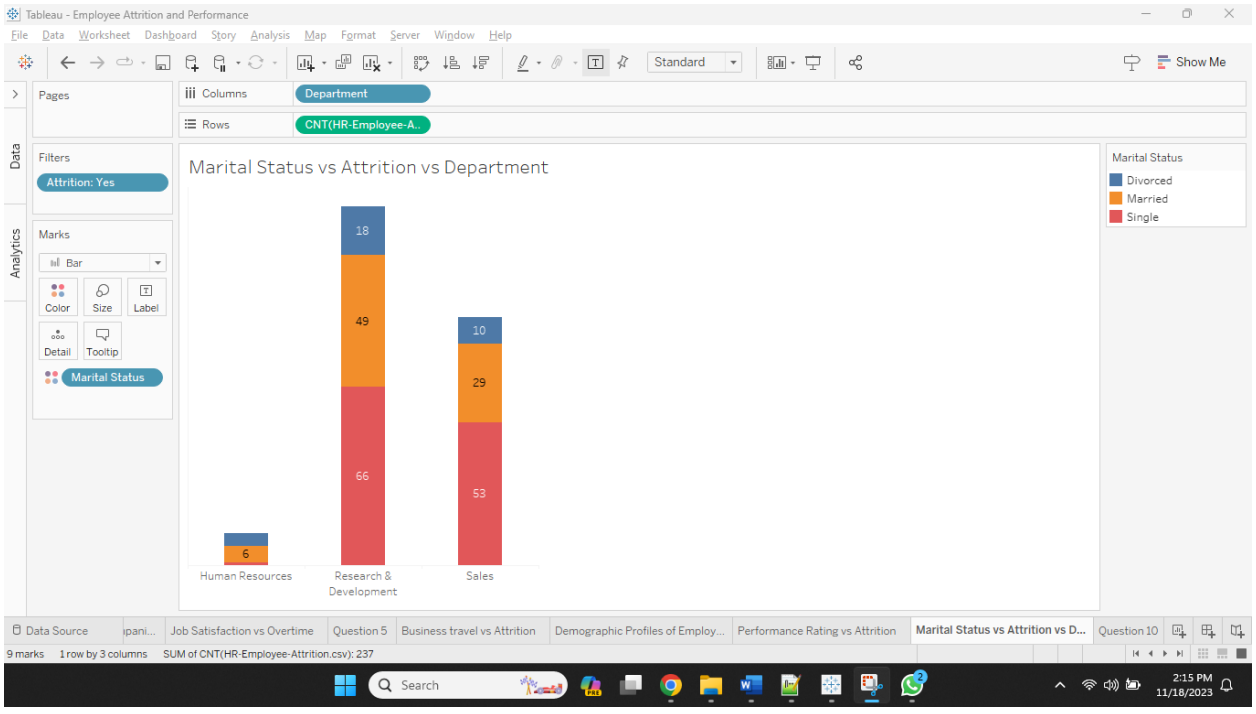
6. The below shown figure represents a series of stack bar charts that are used to uncover demographic profiles of people working in the company. The columns represent the educational degree of an employee and the age group in which they fall. This can be achieved by using the same calculated field of age groups that we created before. The y axis shows the count of employee. Here gender attribute is used and two genders male and female is separated using colour as a pre-attentive attribute. The length is also one of the pre attentive attributes used here that represents count of employees



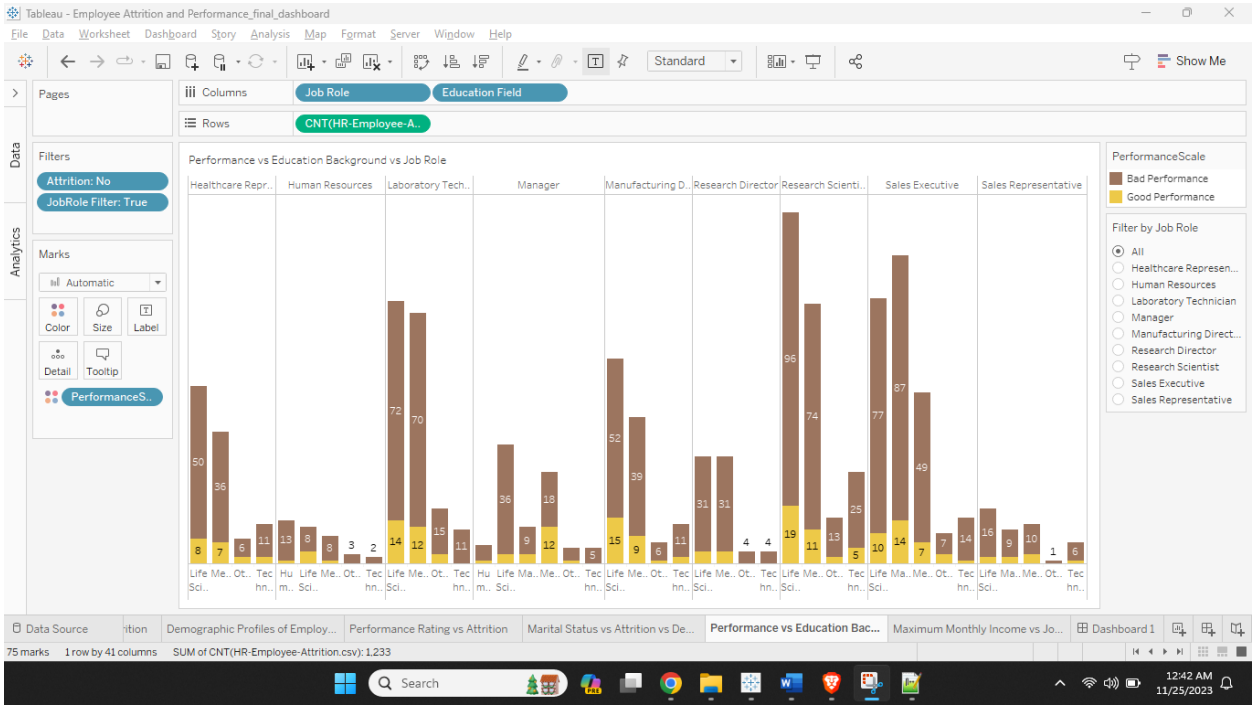
7. Below visualization represents attrition vs performance rating. Attrition is high for employees who are having performance rating =3, whereas it is comparatively low for employees who are having performance rating =4



8. The figure below represents marital status of employees and the department to which they belong and who's attrition status is true. The pre attentive attribute used here is color to categorize different marital status. The length of bar chart showcases count of employees.



9. It provides information about how employees from different education backgrounds are performing in their respective job roles. The pre attentive attribute used here is length and color. Color is used to represent two different categories of performance i.e whether the employee has performed well or not and length is used to compare the count of employees across different job and education categories.



10. The figure shown below can be used to analyze the maximum monthly income received by each employee who's working for a specific job role. The interactive reference line here shows the given value of maximum monthly income and it can be adjusted by creating a filter that takes a particular value at a given instance.

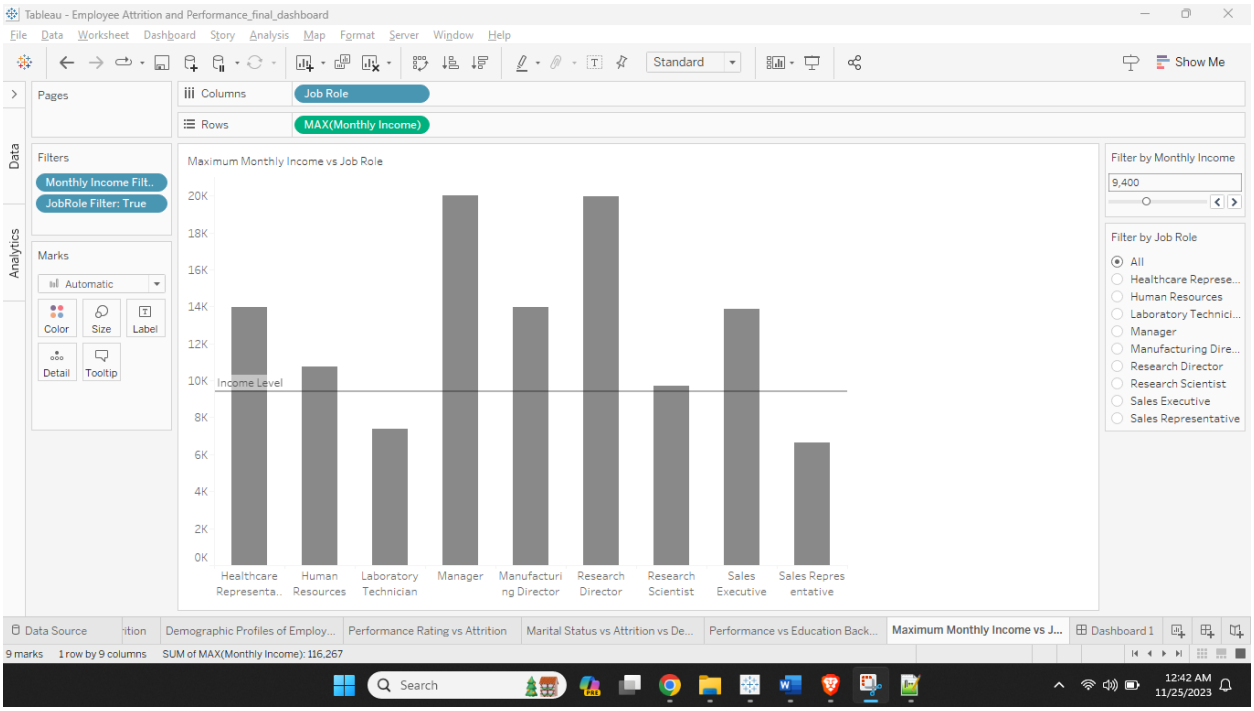


Tableau - Employee Attrition and Performance_final_dashboard
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Show Me
Pages
Columns
Job Role
Rows
MAX(Monthly Income)
Filters
Monthly Income Filt..
JobRole Filter: True
Marks
Automatic
Color
Size
Label
Detail
Tooltip
Maximum Monthly Income vs Job Role
20K
18K
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14K
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8K
6K
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Manufacturing Director
Research Director
Research Scientist
Sales Executive
Sales Representative
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Research Director
Research Scientist
Sales Executive
Sales Representative
Data Source
Demographic Profiles of Employ...
Performance Rating vs Attrition
Marital Status vs Attrition vs De...
Performance vs Education Back...
Maximum Monthly Income vs J...
Dashboard 1
9 marks
1 row by 9 columns
SUM of MAX(Monthly Income): 116,267
Search
12:42 AM
11/25/2023

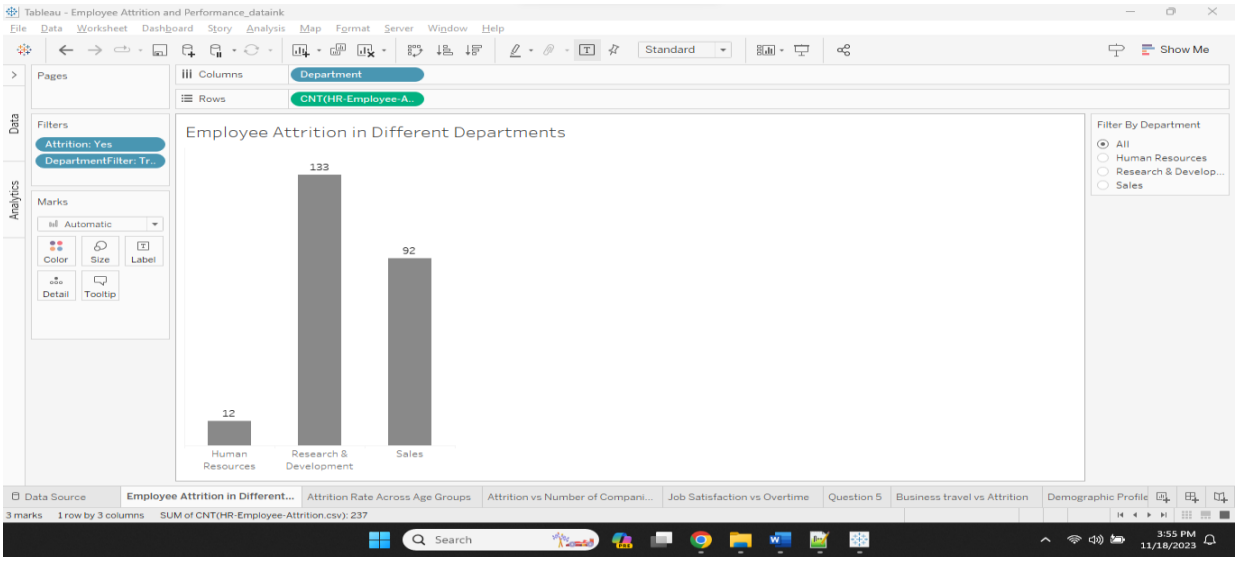
Section 6: Interactivity

Several interactive controls are used in this project to update the data dynamically as needed.

- **Department filter**
- **Monthly Income filter**
- **Job Role filter**
- **Maximum Monthly Income Reference Line**
- **Top N Age Group filter**

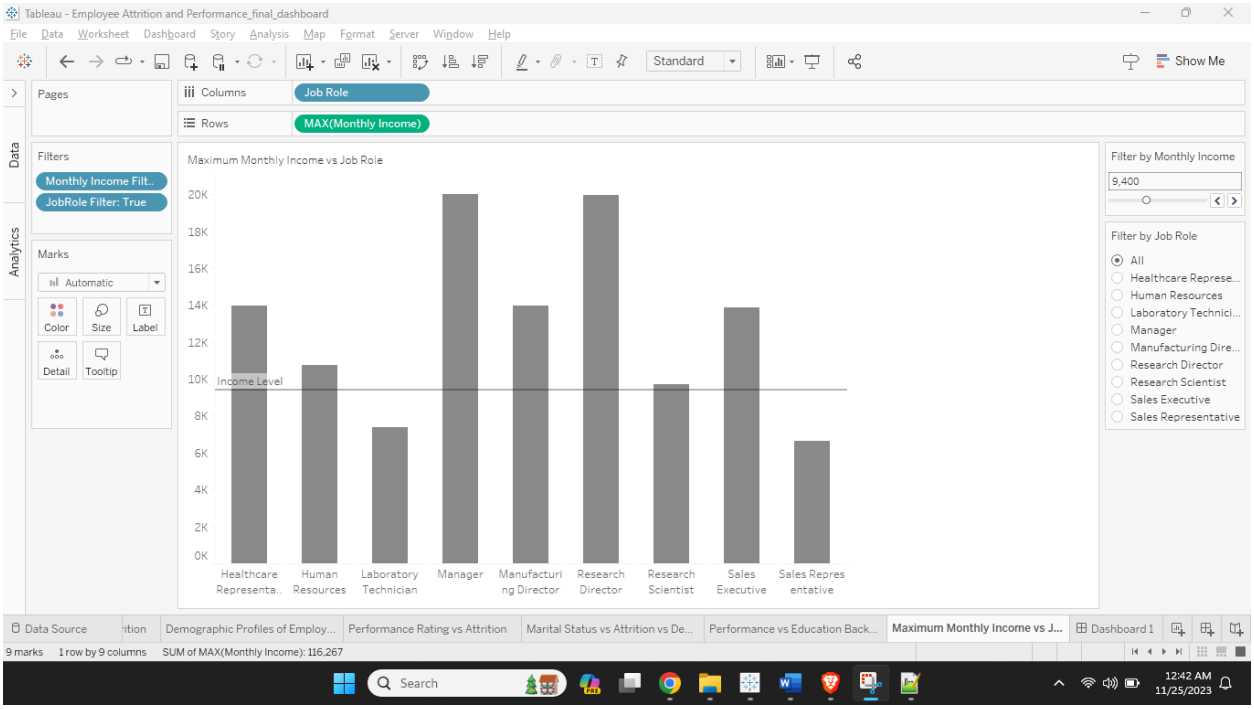
Department Filter:

Users can refine the dataset according to the departments that make up the organization by using the Department filter. Users have the option of comparing attrition and performance indicators across departments or concentrating on just one. When you choose the Human Resources option, for example, the screen will only provide information on workers who work in the HR department. Below is the relevant figure. To exclude the departments, use this specific filter to questions 1 and 8.



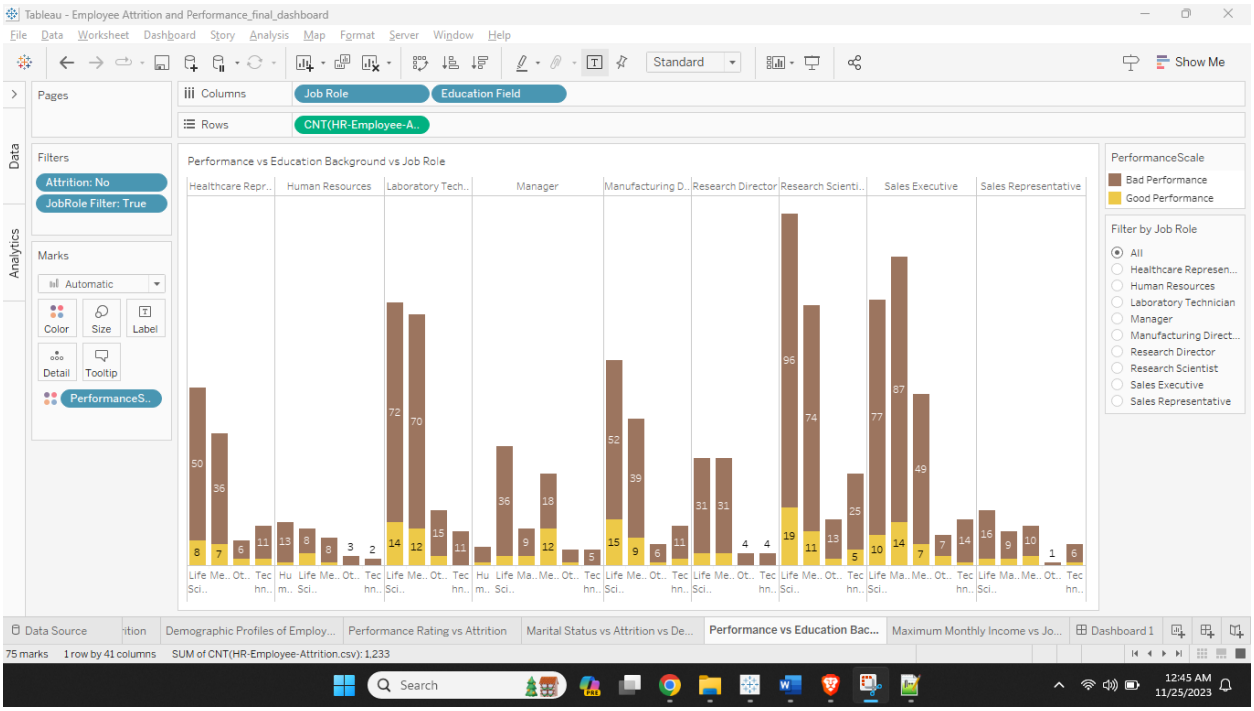
Monthly Income filter:

Users can browse the dataset depending on income levels with the use of the Monthly Income filter. To examine how attrition and performance measures change with different monthly income sources, users can specify income ranges. The slider option allows you to change this range-based filter. In this project, question 10 is subjected to this filter.



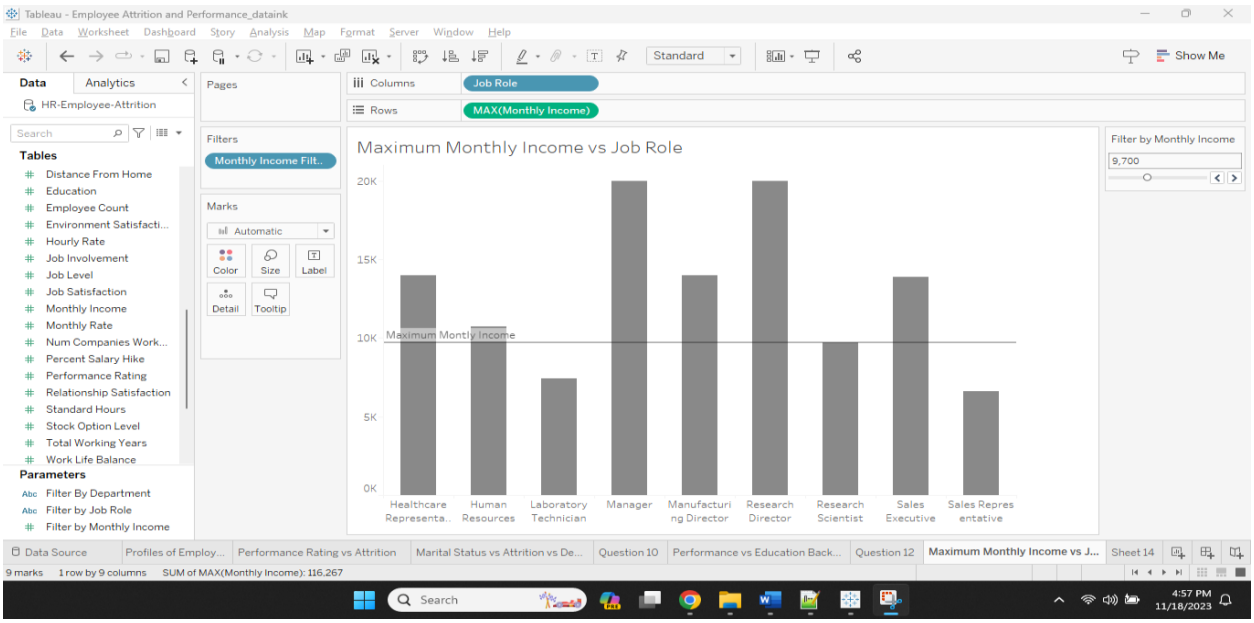
Job Role filter

Users may compare attrition and performance across different jobs within the organization or concentrate on certain job responsibilities by using the Job Role filter. This filter sheds light on the many ways that roles affect the dynamics of the workforce. When a query uses the job role attribute, you may apply this filter.



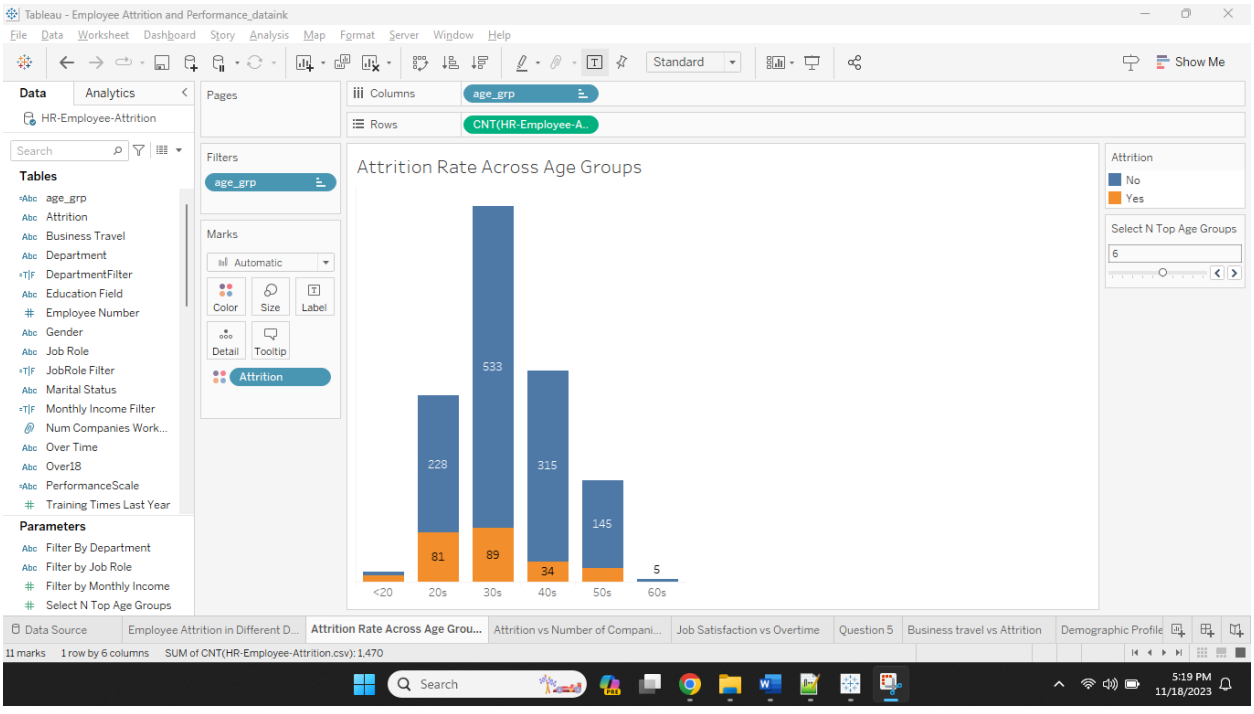
Maximum Monthly Income Reference Line:

The project now includes a persistent reference line that informs the user of the highest monthly salary possible for each employment role. By offering a point of reference on your visualizations, reference lines help readers understand the data in relation to predetermined objectives or standards. It was added to query number 10, and the corresponding picture is provided below.



Top N Age Group filter:

This filter was created to provide users more interaction, allowing them to choose the top N age groups from the provided dataset. This filter was used on the project's second question, and the corresponding image is shown below.



“Which plots are connected to each one”

Department filter and Job filter:

Department one screens out departments, while job role filters out job roles. Both filters function in the same way. While the job role filter may be used to questions 9 and 10, the department filter was used for questions 1 and 8. Both filters may be used to modify the dimensions across several pages once the dashboard has been created.

“The value range for each control and whether it is loaded from a certain attribute in the data.”

1. Top N Age group

   The value range of the Age group filter is obtained from a calculated field. There are five age range categories in the calculated field: <20, <=30, <=40, <=50, and <=60. The characteristic from which this filter is derived in the dataset is the "age" property.
2. Filter by Department and Job Role

   The worksheet itself has been used to add the values for these two filters. Whereas job role filter values are obtained from the job role field in the dataset, department filter values are derived from the department field.
3. Maximum Monthly Income filter and reference line

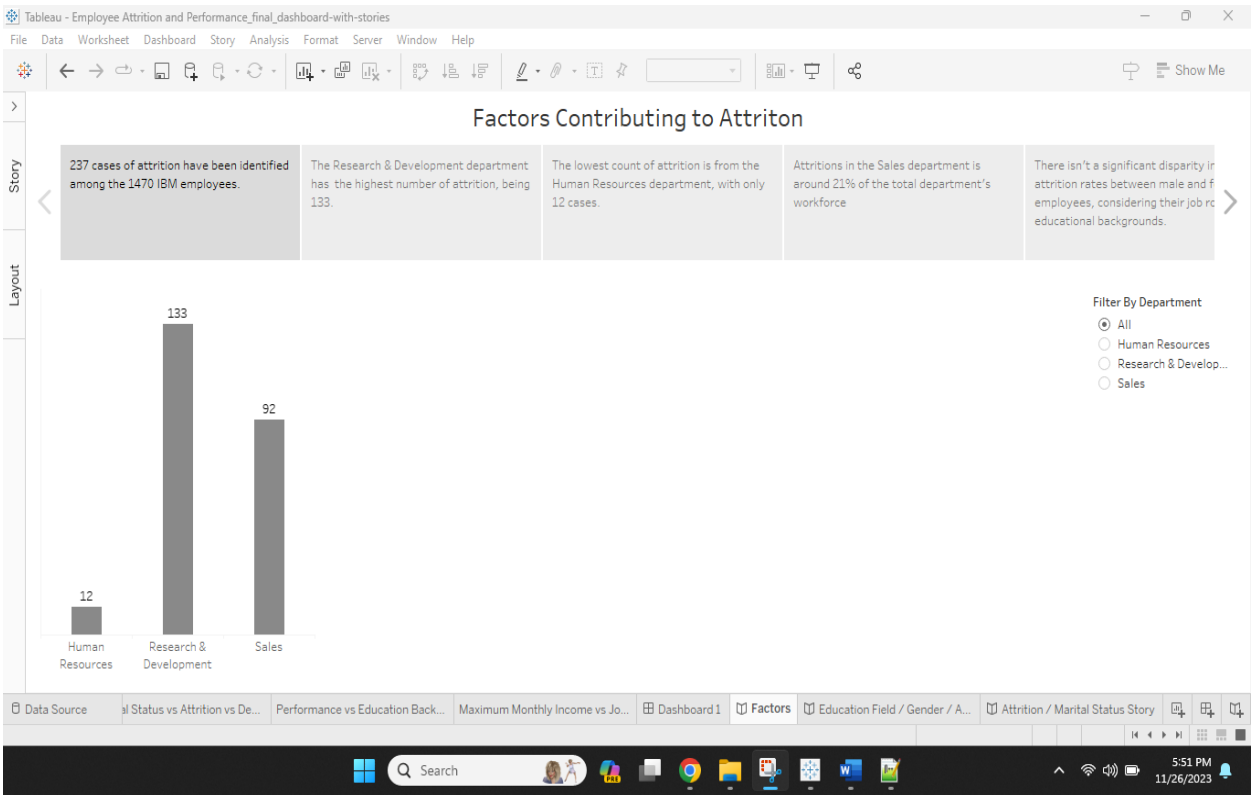
   The parameter is used to get the values for the maximum monthly income filter. As part of the interaction, the user will enter those numbers, which will then be assessed in relation to the Monthly income field in the dataset. The Max. Monthly Income Reference Line modifies the reference line based on the input value by using values from the parameter itself.

Extra Credit: Tableau Story

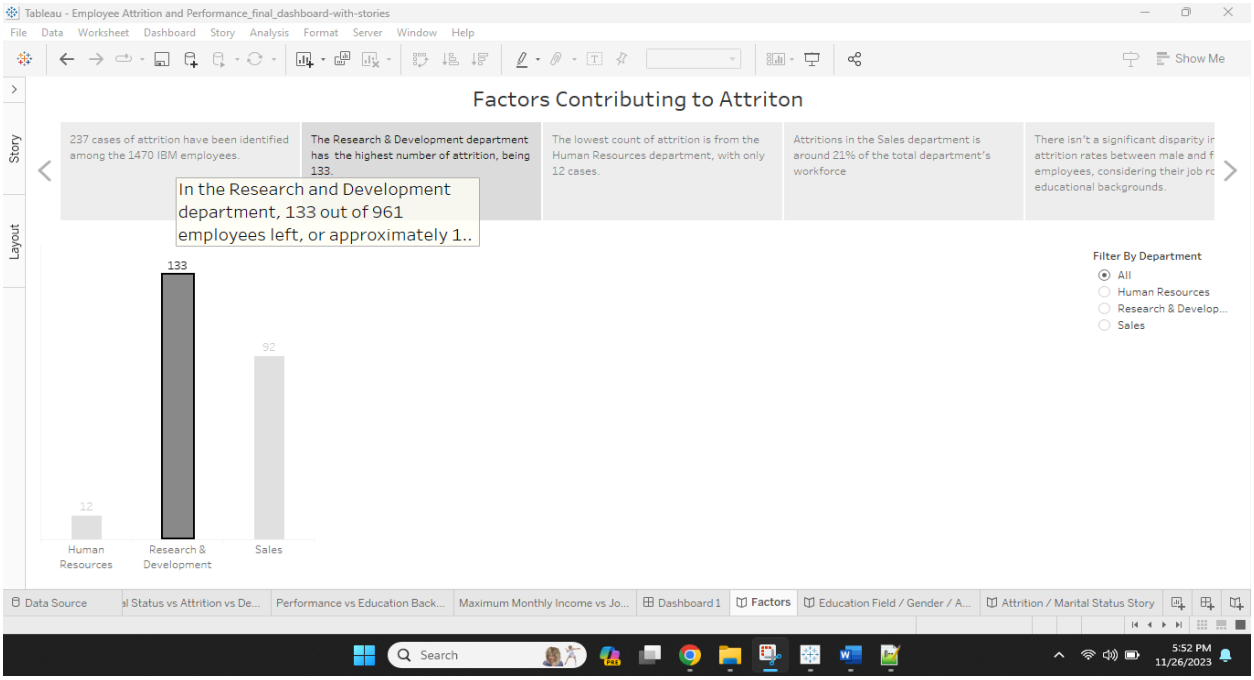
Factors Contributing to Attrition:

The analysis of the IBM employee attrition and performance shows several important trends. Out of a total of 1470 employees in the dataset, 237 cases of attrition have been identified, indicating an overall attrition rate within the company, particularly across different departments. The Research and Development department stands out with the highest attrition, reaching 133 employees leaving, which is approximately 14% of the department's workforce. Surprisingly, the Human Resources department, while having the lowest attrition count of just 12 cases, represents a relatively higher rate of 19% of its total workforce compared to the R&D department. Furthermore, when examining attrition by department, the Sales department has the highest attrition rate among all departments at IBM, with 92 employees out of 446 leaving, accounting for a 21% attrition rate.

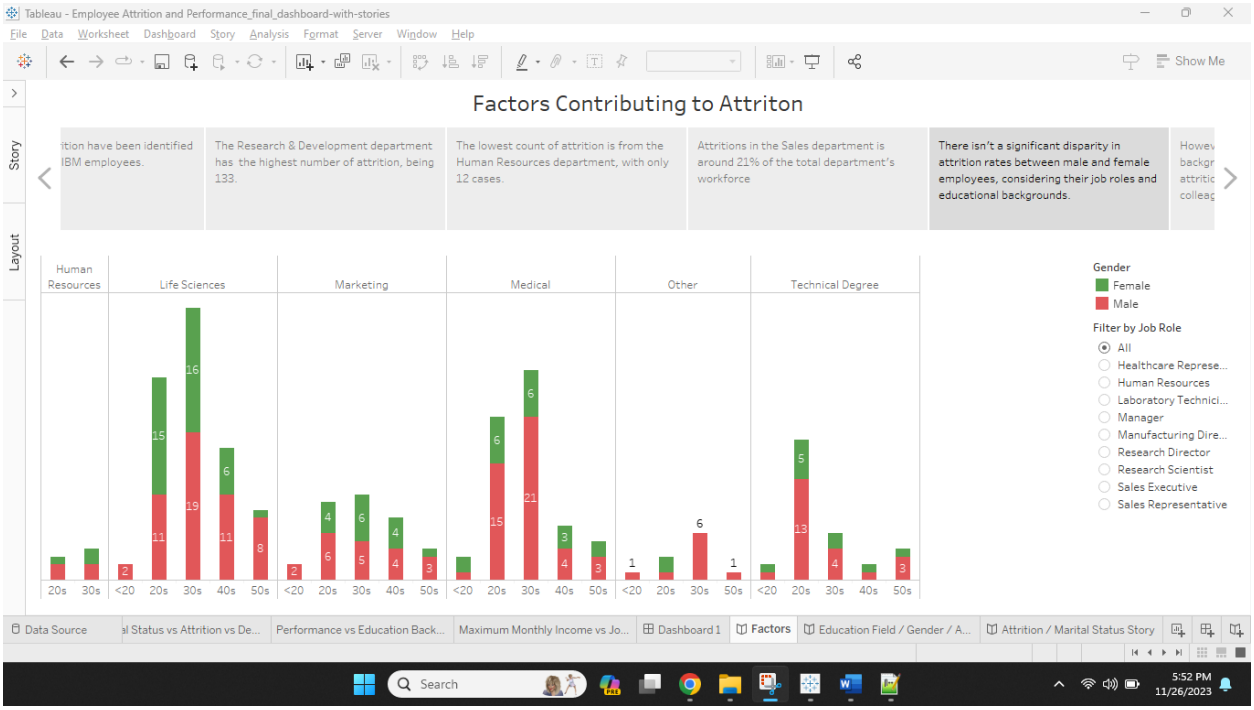
Additionally, we have noticed no significant disparity in attrition rates between male and female employees, considering their job roles and educational backgrounds. However, male employees with a medical background and those in their 20s and 30s have experienced higher attrition rates than their female colleagues. Also, based on marital status, single employees have left the company in greater numbers than other groups, with the Research and Development department and the Sales department having a high attrition rate among single employees, making these findings essential for HR and management decisions in addressing attrition concerns within IBM.



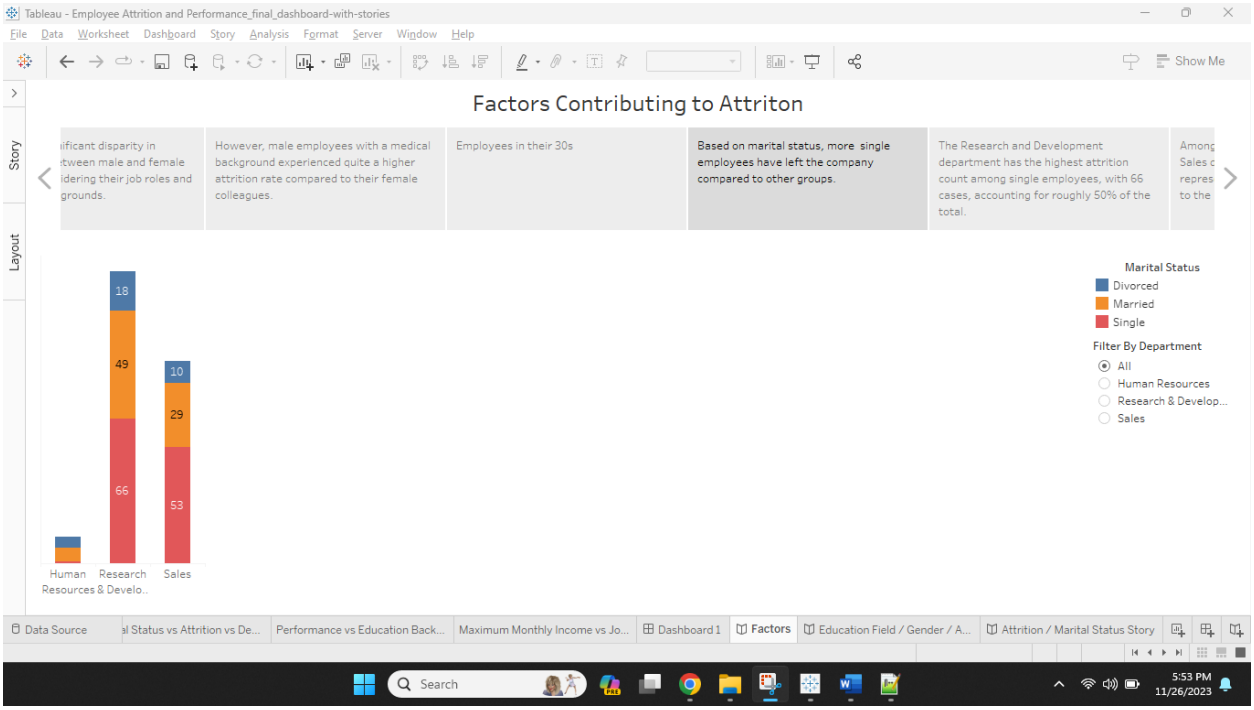
Highlighting the department by clicking on the story card.



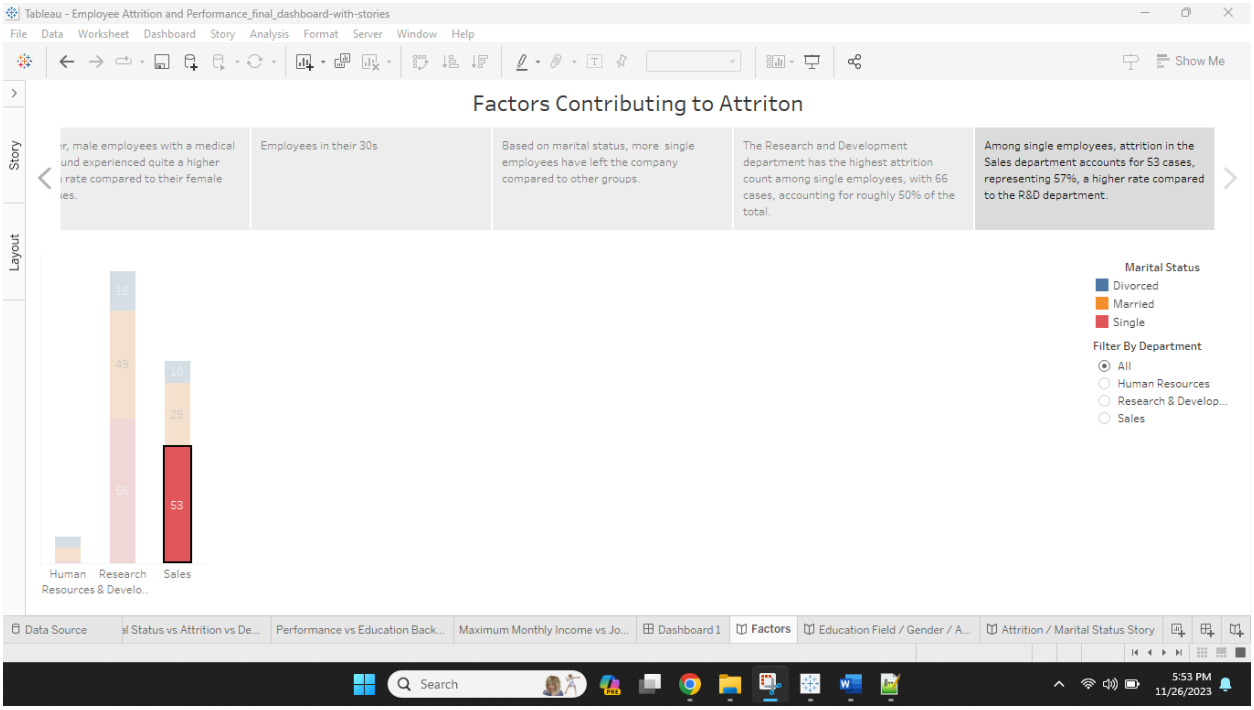
Demographic profile factors:



Marriage factors:



Highlighting the marital status group by clicking on the story card.



References

https://app.mural.co/t/dvproject8285/m/dvproject8285/1699477231560/c68a9dc714b71644bf02bd88e3d20def22004394?sender=u89a9c333b15649a073d68980

https://www.kaggle.com/datasets/pavansubhasht/ibm-hr-analytics-attrition-dataset

https://public.tableau.com/app/profile/naga.sumanth.vema/viz/EmployeeAttritionandPerformance/Dashboard1?publish=yes