Final Task: HR Analytics Project

Objective:

This end-to-end HR analytics project aims to extract key insights on employee attrition, satisfaction, and performance using the **HR_Data** dataset. The project will focus on data cleaning, normalization, and creating a structured data model. The final output will include an interactive Power BI dashboard to visualize these insights, enabling detailed exploration of key trends within the HR data.

Task Breakdown

Step 1: Data Preparation

1.1 Data Import:

- Import the **HR_Data** dataset into your SQL platform (e.g., MySQL, PostgreSQL, or SQL Server).
- Ensure that the data is correctly formatted and accessible for further analysis.

1.2 Data Cleaning:

- Identify and address missing values in critical columns such as:
    - Attrition
    - Business Travel
    - Job Role
    - Education Level
- Remove duplicate records to ensure data consistency.
- Ensure numeric fields such as Age, Monthly Income, and Years at Company are correctly formatted for analysis.

1.3 Data Normalization:

- Create normalized dimensions and fact tables to optimize analysis. These tables will reduce redundancy and improve query performance.

Dimension Tables:

1. **dim_age:** Stores distinct age ranges (e.g., 18-24, 25-34, 35-44, etc.).
2. **dim_attrition:** Stores distinct values for employee attrition status (Yes/No).
3. **dim_business_travel:** Stores business travel types (e.g., Travel_Rarely, Travel_Frequently).

4. **dim_department:** Stores distinct departments (e.g., HR, Sales, IT).
5. **dim_education:** Stores distinct education levels (e.g., Bachelor's, Master's, PhD).
6. **dim_job_role:** Stores distinct job roles (e.g., Manager, Analyst, Executive).
7. **dim_gender:** Stores distinct genders (e.g., Male, Female, Non-Binary).

Fact Table:

- **fact_hr_data:** This fact table stores actual data about employees, with foreign keys linking to the dimension tables.
    - Attributes include:
        - Employee Number
        - Age (linked to **dim_age**)
        - Attrition Status (linked to **dim_attrition**)
        - Monthly Income
        - Job Role (linked to **dim_job_role**)
        - Business Travel (linked to **dim_business_travel**)
        - Department (linked to **dim_department**)
        - Education Level (linked to **dim_education**)
        - Gender (linked to **dim_gender**)

1.4 SQL Documentation:

- Document the SQL queries used for data cleaning, transformation, and normalization.
- Include screenshots of executed queries in a .docx file for reference..

Step 2: Power BI Data Connection

2.1 Data Import:

- Connect Power BI to the SQL database, importing all dimension and fact tables.

2.2 Relationship Building:

- Establish relationships among dimension and fact tables in Power BI to support efficient analysis. Use keys like Employee Number, Department, Job Role, and Education Level for relationship mapping.

Step 3: Key Performance Indicators (KPIs)

3.1 Define and Calculate KPIs:

Calculate the following KPIs to gain insights into employee performance, satisfaction, and attrition:

- **Attrition Rate:** Percent of employees who left the organization (Attrition = Yes).
- **Average Monthly Income:** The average income of employees across departments or roles.
- **Job Satisfaction Levels:** Distribution of employees' job satisfaction ratings (scale of 1–4).
- **Performance Ratings:** Breakdown by performance ratings (1–5 scale).
- **Employee Tenure:** The average number of years employees have been with the company, broken down by department or role.
- **Age Demographics:** Distribution of employees by age bands (e.g., 18-24, 25-34, etc.).

Step 4: Dashboard and Visualizations

Create a **6-page Power BI dashboard** with multiple visuals on each page for better insights and interactivity. Each page should focus on a specific area of analysis.

Page 1: Overview

- **Cards for Summary Metrics:**
    - Total Employees
    - Attrition Rate
    - Average Monthly Income
    - Job Satisfaction Distribution
- **Bar Chart:** Attrition counts by department.
- **Pie Chart:** Distribution of employees by job role.
- **Stacked Column Chart:** Attrition by marital status and gender.
- **KPI Gauge:** Monthly income distribution by gender.

Page 2: Attrition Analysis

- **Clustered Bar Chart:** Attrition counts by gender and marital status.
- **Line Chart:** Attrition trend over time.
- **Matrix Visual:** Attrition breakdown by department, education level, and performance rating.
- **Scatter Plot:** Attrition by monthly income and total working years.
- **Pie Chart:** Attrition rate by education field.

Page 3: Performance Trends

- **Gauge Visuals:** Percentage of top-rated performers.
- **Stacked Bar Chart:** Performance ratings by department.
- **Line and Area Combo Chart:** Trends in performance ratings over years.
- **Scatter Plot:** Monthly income vs. performance ratings.
- **Clustered Column Chart:** Performance rating distribution by age group.

Page 4: Satisfaction Levels

- **Donut Chart:** Job satisfaction distribution.
- **Column Chart:** Work-life balance by department.
- **Line Chart:** Satisfaction trends over the years.
- **Heat Map:** Satisfaction levels by job role and department.
- **Stacked Area Chart:** Satisfaction levels by age bands.

Page 5: Demographic Analysis

- **Histogram:** Age distribution across employees.
- **Stacked Bar Chart:** Age band distribution by department and attrition label.
- **Pie Chart:** Gender distribution across employees.
- **Clustered Column Chart:** Attrition by gender and age group.
- **Map Visual (Optional):** Geographic distribution if applicable (ideal for global organizations).

Page 6: Tenure and Income Analysis

- **Line Chart:** Employee tenure trends across departments.
- **Clustered Bar Chart:** Average monthly income by job role and performance rating.
- **Waterfall Chart:** Income variation by age bands.
- **Tree Map:** Job role distribution by average income.
- **Slicer Panel:** Filter analysis by department, education level, gender, and job role.

Step 5: Filters and Slicers

5.1 Add Filters and Slicers:

- **Date Filter:** Slicer for time-specific analysis (e.g., monthly or yearly trends).
- **Department Filter:** Slicer to focus on specific departments.
- **Job Role Filter:** Slicer for individual role insights.
- **Gender Filter:** Slicer to differentiate gender-based analysis.

Step 6: Insights and Interpretation

6.1 Insights Page:

Create a dedicated insights page that summarizes key findings from the analysis. This page should provide actionable insights from the visualizations.

- **Attrition Drivers:** Highlight the primary causes of attrition, such as low income, poor satisfaction, or limited career progression.

- **Top-Performing Departments:** Identify departments with the highest performance ratings and satisfaction.
- **Demographic Insights:** Present key trends based on gender, age, and roles that affect performance and retention.

6.2 Report:

Write a detailed .docx report that includes:

- SQL queries used for data cleaning and transformation.
- Power BI setup, including the creation of visuals and relationships.
- Key insights and interpretations based on the dashboard's data.

Step 7: Final Review and Presentation

- **Visual Formatting:** Ensure all visuals are clearly labeled and formatted for readability and presentation.
- **Save the Power BI Dashboard:** Save the final Power BI dashboard as a .pbix file.
- **Prepare the Report:** Prepare a .docx report detailing:
    - SQL queries used for data preparation and transformation.
    - Overview of Power BI setup and visuals.
    - Key insights and conclusions drawn from the data.