HR ANALYTICS PROJECT – SQL INSIGHTS

CREATED BY

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Project Overview:

- In this project, I used SQL to analyse an HR dataset and find useful insights about **employee attrition**, **salaries, performance, and how long employees stay at the company**. The main idea was to answer important HR questions and help make better decisions by spotting patterns and trends in the data using SQL queries.

Dataset Used:

Dataset: HR Analytics Prediction dataset
Tool: SQL (MySQL Workbench)

SQL Techniques Used

- **SELECT and WHERE Clauses** – For filtering specific employee data.
- **Aggregate Functions** – Summarizing data using COUNT, AVG, SUM, and ROUND.
- **GROUP BY and ORDER BY** – To organize and sort data by department, job role, age, etc.
- **Conditional Aggregation** – Using CASE WHEN inside aggregate functions for conditional counts.
- **UNION ALL** – To combine results from multiple queries (e.g., comparing employees who left vs. stayed).
- **Common Table Expressions (CTEs)** – With WITH statements to structure complex queries in steps.
- **JOINS** – For combining data from different subqueries or tables logically.
- **Calculated Columns** – Using arithmetic to calculate percentages and ratios.
- **Aliases** – Using AS to rename columns and values for clearer results.

Key Business Questions & SQL Insights:

1) Employee Retention & Attrition:

Q: How many employees have left vs stayed?

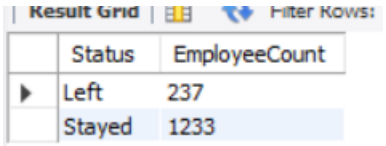
Query:

```
SELECT 'Left' AS Status, COUNT(EmployeeNumber) AS EmployeeCount
FROM employee_details
WHERE Attrition = 'Yes'

UNION ALL

SELECT 'Stayed' AS Status, COUNT(EmployeeNumber) AS EmployeeCount
FROM employee_details
WHERE Attrition = 'No';
```

Output:



Status	EmployeeCount
Left	237
Stayed	1233

Insight:

Out of **1,470** employees, **237** employees have **left** the company while **1,233** employees have **stayed**.
This means the company has a high employee **retention rate of around 83.88%**, and an **attrition (turnover) rate of approximately 16.12%**.
Overall, the organization has retained most of its workforce, indicating a relatively stable employee base.

Q: What is the attrition rate by department, job role, or age group?

Query:

```
SELECT Age, JobRole, Department,
    (COUNT(CASE WHEN Attrition = 'Yes' THEN 1 END) * 100.0) / COUNT(*)  AS AttritionRate
FROM employee_details
GROUP BY Age, JobRole, Department;
```

Output:

Age	JobRole	Department	AttritionRate
34	Laboratory Technician	Research & Development	22.22222
28	Laboratory Technician	Research & Development	57.14286
29	Manufacturing Director	Research & Development	0.00000
32	Research Scientist	Research & Development	11.76471
22	Laboratory Technician	Research & Development	33.33333
53	Manager	Sales	0.00000
38	Research Scientist	Research & Development	0.00000

Insight:

The data shows that certain job roles like **"Human Resources", "Sales Representative"**, and **"Laboratory Technician"** have very high attrition rates, with some even reaching 100% attrition.

This indicates that employees in these roles are more likely to leave the company compared to others.
Departments like **Sales and Research & Development** appear frequently among high-attrition roles, suggesting these areas may need focused retention strategies such as better engagement programs, career development opportunities, or workload management improvements.

Q: Are certain job roles or education levels more likely to leave?

Query:

```
WITH employeeleft AS
    (SELECT JobRole, COUNT(JobRole) AS employee_left
    FROM employee_details
    WHERE Attrition = 'Yes'
    GROUP BY JobRole
    ORDER BY employee_left DESC),

totalemployee AS
    (SELECT COUNT(EmployeeCount) AS total, JobRole
    FROM employee_details
    GROUP BY JobRole),

attritionrate AS
    (SELECT e.JobRole,e.employee_left, t.total, CONCAT(ROUND((e.employee_left/t.total)*100,2),'%') AS 'Attrition Rate'
    FROM employeeleft e
    JOIN totalemployee t ON e.JobRole = t.JobRole
    )

    SELECT * FROM attritionrate;
```

Output:

	JobRole	employee_left	total	Attrition Rate
▶	Sales Executive	57	326	17.48%
	Research Scientist	47	292	16.10%
	Laboratory Technician	62	259	23.94%
	Manufacturing Director	10	145	6.90%
	Healthcare Representative	9	131	6.87%
	Manager	5	102	4.90%
	Sales Representative	33	83	39.76%

Insight:

From the analysis, **Sales Representatives** have the highest attrition rate at **39.76%**, followed by **Laboratory Technicians (23.94%)** and **Human Resources (23.08%).**
This suggests that employees in these roles are significantly more likely to leave the company compared to others.
In contrast, roles like Research Director (2.5%) and Manager (4.9%) have very low attrition rates, indicating better retention in these positions.
These findings highlight the need for targeted retention efforts, especially for Sales and Technical roles.

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2) Salary & Compensation Analysis:

Q: What is the average salary by job role and department?

Query:

```
SELECT JobRole, Department, ROUND(AVG(MonthlyIncome),2) AS avg_salary
FROM employee_details
GROUP BY JobRole, Department;
```

Output:

JobRole	Department	avg_salary
Sales Executive	Sales	6924.28
Research Scientist	Research & Development	3239.97
Laboratory Technician	Research & Development	3237.17
Manufacturing Director	Research & Development	7295.14
Healthcare Representative	Research & Development	7528.76
Manager	Sales	16986.97
Sales Representative	Sales	2626.00

Insight:

The **average salary** analysis shows that Managers across all departments, especially in **Human Resources (₹18,088.64)** and **Research & Development (₹17,130.33)**, have the highest monthly incomes.
Research Directors (₹16,033.55) and **Sales Managers (₹16,986.97)** also earn significantly higher than other roles.
On the other hand, **Sales Representatives (₹2,626.00)** and **Laboratory Technicians (₹3,237.17)** have relatively lower average salaries.
This highlights a noticeable gap in compensation between leadership roles and entry to mid-level roles.

Q: Is there a correlation between monthly income and attrition?

Query:

```
SELECT 'Yes' AS Attrition, AVG(MonthlyIncome) AS avg_salary
FROM employee_details
WHERE Attrition = 'Yes'

UNION ALL

SELECT 'No' AS Attrition, AVG(MonthlyIncome) AS avg_salary
FROM employee_details
WHERE Attrition = 'No';
```

Output:

Attrition	avg_salary
Yes	4787.0928
No	6832.7397

Insight:

Employees who **left** the company had an average monthly income of around **₹4,787.09,**
while those who **stayed** earned a higher average of about **₹6,832.74.**
This suggests that **lower salaries may be a significant factor contributing to employee attrition**.

Q: Which departments have the highest total salary expenditure?

Query:

```
SELECT Department, SUM(MonthlyIncome) AS total_Salary_expenditure
FROM employee_details
GROUP BY Department
ORDER BY total_Salary_expenditure DESC;
```

Output:

	Department	total_Salary_expenditure
▶	Research & Development	6036284
	Sales	3103791
	Human Resources	419234

Insight:

The **Research & Development** department had the **highest total salary expenditure at ₹6,036,284**,
followed by the **Sales** department at **₹3,103,791.**
Human Resources had the lowest total expenditure with **₹419,234.**
This indicates that **Research & Development is the largest investment area** in terms of employee compensation.

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3) Work-Life Balance & Job Satisfaction:

Q: What is the average work-life balance score by job role?

Query:

```
SELECT JobRole, ROUND(AVG(WorkLifeBalance),2) AS avg_work_life_balance_score
FROM employee_details
GROUP BY JobRole
ORDER BY avg_work_life_balance_score DESC;
```

Output:

	JobRole	avg_work_life_balance_score
▶	Human Resources	2.92
	Sales Representative	2.89
	Research Director	2.86
	Sales Executive	2.80
	Manufacturing Director	2.77
	Manager	2.77
	Laboratory Technician	2.72

Insight:

Among all job roles, **Human Resources** employees reported the highest average work-life balance score at **2.92**,
closely followed by **Sales Representatives** and Research **Directors.**
Research Scientists recorded the lowest average score at **2.68**,
suggesting slightly lower work-life balance satisfaction in that role compared to others.

Q: Is job satisfaction influencing attrition?

Query:

```sql
SELECT 'Left' AS Attrition, ROUND(AVG(JobSatisfaction),1) AS avg_job_satisfaction
FROM employee_details
WHERE Attrition = 'Yes'

UNION ALL

SELECT 'Stayed' AS Attrition, ROUND(AVG(JobSatisfaction),1) AS avg_job_satisfaction
FROM employee_details
WHERE Attrition = 'No';
```

Output:

	Attrition	avg_job_satisfaction
▶	Left	2.5
	Stayed	2.8

Insight:

Employees who **left** the company had an average job satisfaction score of 2.5, while those who **stayed** had a higher average score of 2.8.
This indicates that **lower job satisfaction is associated with a higher likelihood of attrition.**

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4) Employee Performance & Promotions:

Q: How many employees got a promotion in the last 5 years?

Query:

```sql
SELECT COUNT(EmployeeNumber) AS no_employees_promotion_last_5years
FROM employee_details
WHERE YearsSinceLastPromotion <=5;
```

Output:

	no_employees_promotion_last_5years
▶	1255

Insight:

A total of **1,255 employees** received a **promotion within the last 5 years**, indicating that a significant portion of the workforce has experienced career growth opportunities recently.

Q: Is there any relationship between performance rating and attrition?

Query:

```sql
SELECT 'Left' AS Attrition, AVG(PerformanceRating) AS avg_performance_rating
FROM employee_details
WHERE Attrition = 'Yes'

UNION ALL

SELECT 'Stayed' AS Attrition, AVG(PerformanceRating) AS avg_performance_rating
FROM employee_details
WHERE Attrition = 'No';
```

Output:

Attrition	avg_performance_rating
Left	3.1561
Stayed	3.1533

Insight:

The **average performance rating** is very similar between employees who **left** (**3.16**) and those who **stayed** (**3.15**),
suggesting that **performance rating may not be a strong factor influencing attrition** in this organization.

Q: Do employees with more training have higher performance ratings?

Query:

```
SELECT TrainingTimesLastYear, AVG(PerformanceRating) AS avg_performance_rating
FROM employee_details
GROUP BY TrainingTimesLastYear
ORDER BY avg_performance_rating DESC;
```

Output:

TrainingTimesLastYear	avg_performance_rating
0	3.1852
2	3.1627
5	3.1597
3	3.1507
6	3.1385
4	3.1301

Insight:

No clear positive relationship is evident between the number of training sessions and performance. In fact, employees who received **no training** have slightly higher average performance ratings, while those with more training tend to have slightly lower ratings.

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5) Tenure & Experience:

Q: What's the average years at company by job role or department?

Query:

```
SELECT Department, JobRole, ROUND(AVG(YearsAtCompany), 2) AS avg_years
FROM employee_details
GROUP BY Department, JobRole
ORDER BY avg_years DESC;
```

Output:

Department	JobRole	avg_years
Human Resources	Manager	16.27
Sales	Manager	15.22
Research & Development	Manager	13.52
Research & Development	Research Director	10.94
Research & Development	Healthcare Representative	8.37
Research & Development	Manufacturing Director	7.60

Insight:

- **Longer Tenure in Managerial Roles**: Managerial positions in *Human Resources* (16.27 years) and *Sales* (15.22 years) tend to have longer tenures, indicating more career stability.
- **Moderate Tenure in R&D**: Roles in *Research & Development* like *Research Director* (10.94 years) and *Healthcare Representative* (8.37 years) show moderate tenure.
- **Shorter Tenure in Sales**: *Sales Representatives* (2.92 years) and *Sales Executives* (7.50 years) have shorter tenures, possibly due to higher turnover in sales jobs.
- **R&D Positions**: *Laboratory Technicians* (5.02 years) and *Research Scientists* (5.11 years) show moderate tenure, suggesting some turnover but relatively stable compared to sales roles.

Q: How many employees have been with the company for more than 10 years?

Query:

```
SELECT COUNT(EmployeeNumber) AS no_of_employees
FROM  employee_details
WHERE YearsAtCompany >=10;
```

Output:

no_of_employees
366

Insight:

366 employees have been with the company for more than 10 years, highlighting strong employee retention.
