Executive Report: Employee Attrition & Predictive Insights

Project Overview: End-to-End HR Analytics

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1. The Business Problem

Employee turnover (attrition) is a significant expense for any MNC. High attrition rates lead to:

- **Increased Recruitment Costs:** Advertising, interviewing, and onboarding.
- **Loss of Knowledge:** Departure of experienced staff reduces operational efficiency.
- **Cultural Impact:** High turnover can lower morale for remaining employees.

The Objective: Identify the primary drivers of employee attrition and provide a data-backed roadmap to improve retention.

2. Methodology & Tech Stack

To solve this, we utilized a multi-stage analytical approach:

- **Data Engineering (SQL):** Cleaned and transformed raw HR data into structured tables for analysis. Calculated key metrics like "Attrition Rate" and ranked high-risk categories.
- **Exploratory Data Analysis (Python/Pandas):** Performed deep-dives into correlations between tenure, income, and job roles.
- **Visualization (PowerBI):** Developed an interactive dashboard (`Hr-Attrition.pbix`) for real-time monitoring of HR health.

3. Key Findings & Problem Solving

Through the analysis of the `clean_hr_data.csv`, we identified and solved three critical business questions:

A. Who is at the highest risk?

- **Insight:** Employees in the **"0-1 Years" tenure group** have the highest attrition rate at **25.96%**, compared to just 10.42% for those with 8+ years.
- **Solution:** We identified a "Critical Early-Stage" window. The recommendation is to enhance the 12-month mentorship program to improve early-career engagement.

B. Is Compensation the primary driver?

- **Insight:** SQL analysis showed a significant correlation between `OverTime` and `MonthlyIncome`. Employees working overtime with an income below $4,000 were flagged as "High Risk".
- **Solution:** We created a `risk_category` column in the database to help HR managers proactively identify underpaid, overworked talent before they resign.

C. Which Departments are struggling?

- **Insight:** Attrition is not uniform. The analysis ranked departments and job roles (like Sales Executives and Laboratory Technicians) to see where the "Risk_Rank" was highest.
- **Solution:** Targeted "Stay Interviews" are now scheduled for high-risk roles identified in the `Risk_Rank` query.

4. Technical Implementation Highlights

The project utilized advanced SQL techniques to automate reporting:

- **Window Functions:** Used `RANK() OVER (ORDER BY AVG(Attrition) DESC)` to dynamically identify the top departments losing talent.
- **Conditional Logic:** Implemented `CASE` statements to segment employees into `Age_group`, `Income_Band`, and `Tenure_group` for more granular reporting.

5. Strategic Recommendations for Management

1. **Revise Compensation for High-Overtime Roles:** Address the "High Risk" segment identified in the SQL analysis (Overtime + Low Income).
2. **Focus on the First 3 Years:** Shift HR resources toward the "0-1 Years" and "4-7 Years" tenure groups where attrition is most volatile.
3. **Department-Specific Retention:** Sales and R&D showed unique patterns; HR should tailor "Work-Life Balance" initiatives specifically for these high-pressure departments.

Data Source Summary:

- **Dataset:** 1,470+ employee records including 30+ variables like DistanceFromHome, JobSatisfaction, and MonthlyIncome.
- **Tools:** SQL (Analysis), Python (Exploration), PowerBI (Reporting)