HR Analytics: Employee Turnover Prediction at Salifort Motors

PLAN

Situation: Salifort Motors is experiencing high employee turnover.
Impact: This situation poses a strategic challenge for Salifort Motors due to increased hiring and training costs, as well as lost productivity.
Objective: Predict whether an employee will resign and understand the variables that most influence that decision, in order to improve talent retention and optimize HR decision-making.

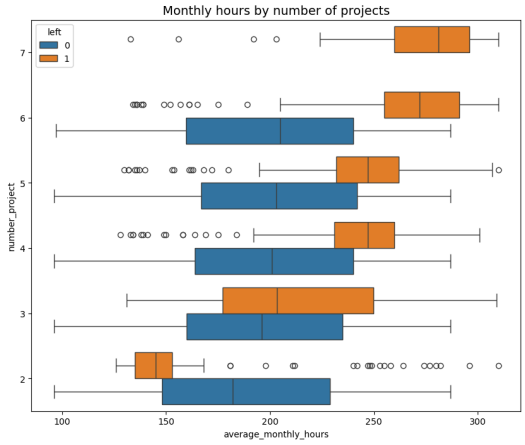
Data analysis

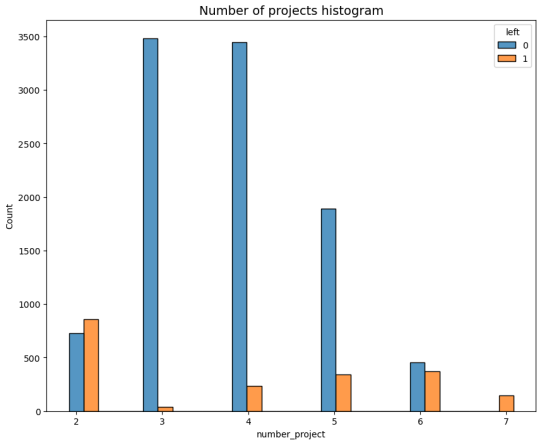
A dataset of 14,999 employees and 10 variables was used:

- Satisfaction level
- Performance evaluation
- Number of projects
- Monthly hours worked
- Time at the company
- Work accidents
- Promotions in the last 5 years
- Department
- Salary
- Whether the employee resigned

Exploratory Analysis

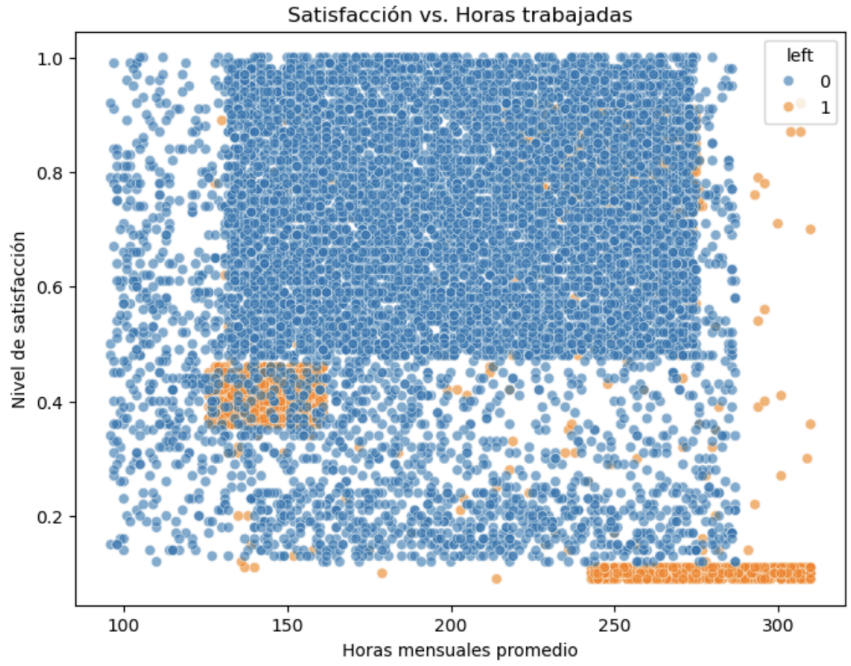
Relationship between number of projects, hours worked, and employee turnover





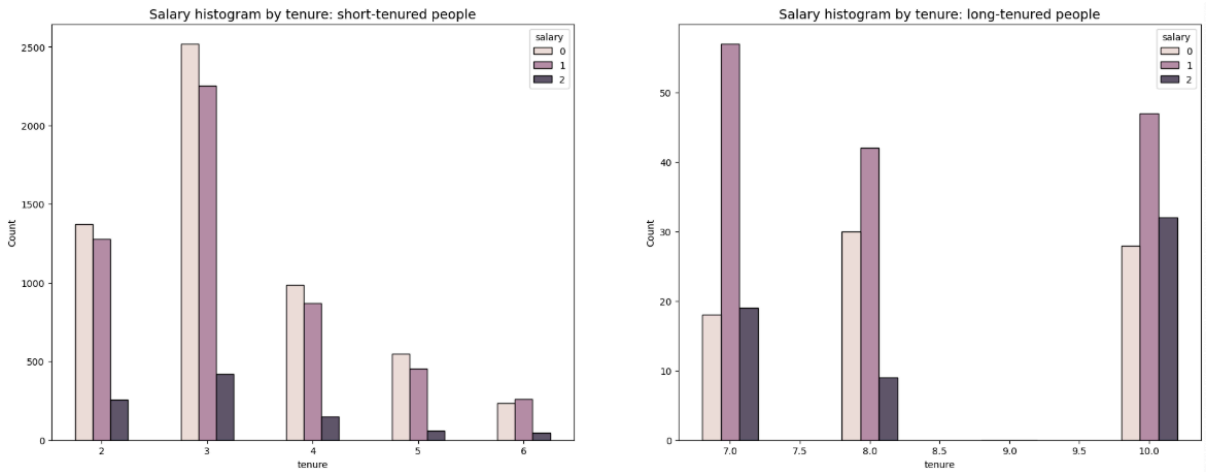
- Employees with 2 projects and few hours tend to leave.
- Employees with 6–7 projects and many hours also tend to leave.
- The highest retention occurs in the middle range: 3–5 projects.

Satisfaction vs. Monthly Hours



- Employees working between 240 and 315 monthly hours (equivalent to more than 60 hours per week) showed very low satisfaction levels and a high resignation rate.

Salary distribution by years of service



The chart on the left shows the distribution of employees with less than 7 years of service, and the one on the right, those with more than 6 years.

- Most employees are in the left group, with frequency peaks between 2 and 3 years. This suggests high turnover and that many employees do not stay more than 3 years at the company. Most have low or medium salaries, very few have high salaries, which may lead to early dissatisfaction due to the lack of strong salary incentives in the early years.
- As seniority increases, the number of employees decreases.
- Few people reach 10 years, possibly due to a lack of salary incentives.

Application and Recommendations

Proposed Solution:
Implementation of a Random Forest model to identify employees at risk of resignation with high accuracy. This model was trained and evaluated using employee data and showed outstanding performance:

Model	F1	Recall	Precision	Accuracy	AUC
Random Forest	0.9545	0.9221	0.9892	0.9854	0.9601

92% recall
The model correctly identifies the vast majority of employees who will resign. This allows timely intervention with retention measures such as promotions, workload redistribution, or salary review.

98.9% precision
Of all the cases the model flags as "resignation risk," almost all are correct. That is, unnecessary interventions are avoided.

AUC of 0.96
The model has excellent ability to distinguish between those who will stay and those likely to leave, ensuring decision-making reliability.

Recommendations for Salifort Motors:

Short Term:

- Implement an alert system based on the trained model. This model can become a key tool to anticipate talent loss and improve HR efficiency proactively and strategically.
- Measure and act on satisfaction and burnout levels.

Medium Term:

- Better distribute workload: assign 2 to 5 projects per employee.
- To retain talent, the company should focus on improving salary conditions or offering promotions during the first 2–4 years, when most employees are at risk of leaving.