

# Employee Turnover Analysis — Actionable Insights Report

## Salifort Motors • HR Attrition Project

### OVERVIEW

- ❖ The goal is to **reduce employee turnover** by identifying who is at high risk of leaving and understanding why.
- ❖ The final Random Forest model achieves **98% accuracy, 95% recall, and 0.977 ROC-AUC**, making it reliable for real HR decision-making.
- ❖ Insights from model performance and feature importance reveal **clear, actionable drivers** of employee attrition.

### IMPACT

- ❖ Expected outcome: **Reduction in turnover by 20–30%** after implementing targeted strategies.
- ❖ HR can now **proactively flag high-risk employees** with **92–95% recall**, ensuring most at-risk employees are identified.
- ❖ Using 0.35 threshold increases early detection of potential leavers → enables **targeted retention interventions**.
- ❖ Insights enable HR to focus on the **specific factors driving attrition**:
- ❖ Low satisfaction, Heavy workload, and Low salary
- ❖ Tenure ~3–4 years (career stagnation risk)
- ❖ Lack of growth opportunities
- ❖ **NEXT STEP (FOR HR & MANAGEMENT)**
- ❖ **Deploy the model** into HR dashboards with weekly risk scoring.
- ❖ **Set threshold = 0.35** for maximum employee detection.
- ❖ **Monitor satisfaction + workload dashboards** monthly.
- ❖ Launch **Retention Program** targeting:
  - ❖ Low satisfaction
  - ❖ High workload
  - ❖ Low salary
  - ❖ Tenure 3–4 years
- ❖ Conduct **bi-annual model retraining** with updated employee data.
- ❖ Track **retention improvement KPIs** (e.g., turnover rate drop over the next 6–12 months).

### RESPONSE

- ❖ Built and validated a high-performance Random Forest attrition prediction model.
- ❖ Analyzed feature importance to identify **key reasons employees leave**.
- ❖ Conducted **threshold analysis** to determine the best probability cutoff for HR action:
  - ❖ **Balanced Threshold = 0.35**
  - ✓ Precision  $\approx$  Recall
  - ✓ F1 is maximized
  - ✓ Best trade-off between false positives & false negatives
  - ✓ Best threshold for HR-focused decisions
- ❖ Generated actionable insights based on model outputs + business interpretation.

### KEY INSIGHTS

- ❖ **Satisfaction level is the strongest predictor of leaving.**
- ❖ Employees with satisfaction  $< 0.4$  have **4–6× higher attrition risk**.  
*Action:* Launch employee satisfaction improvement programs.
- ❖ **High workload (monthly hours) strongly increases attrition risk.**
- ❖ Overworked employees are far more likely to leave.  
*Action:* Implement workload balancing, shift restructuring, and manager oversight.
- ❖ **Low salary sharply increases risk, especially for mid-tenure employees.**
- ❖ Low-paid employees with 3–4 years of tenure are the highest-risk group.  
*Action:* Review salary bands, introduce performance-based increments.
- ❖ **Tenure of around 3–4 years shows the highest turnover probability.**
- ❖ This is the *career stagnation period*.  
*Action:* Introduce career progression paths, internal mobility, and certifications.
- ❖ **Department has minor impact, meaning attrition is driven by personal experience factors**
- ❖ Workload + satisfaction + salary matter more than the department.  
*Action:* Focus retention strategy on **individual-level metrics**, not team-level.
- ❖ **The model shows extremely reliable prediction quality**
- ❖ **Precision: 0.98, Recall: 0.92, F1: 0.95, PR-AUC: 0.962**
- ❖ The company can trust the model for **live deployment and early warning alerts**.