Employee Turnover Prediction Model

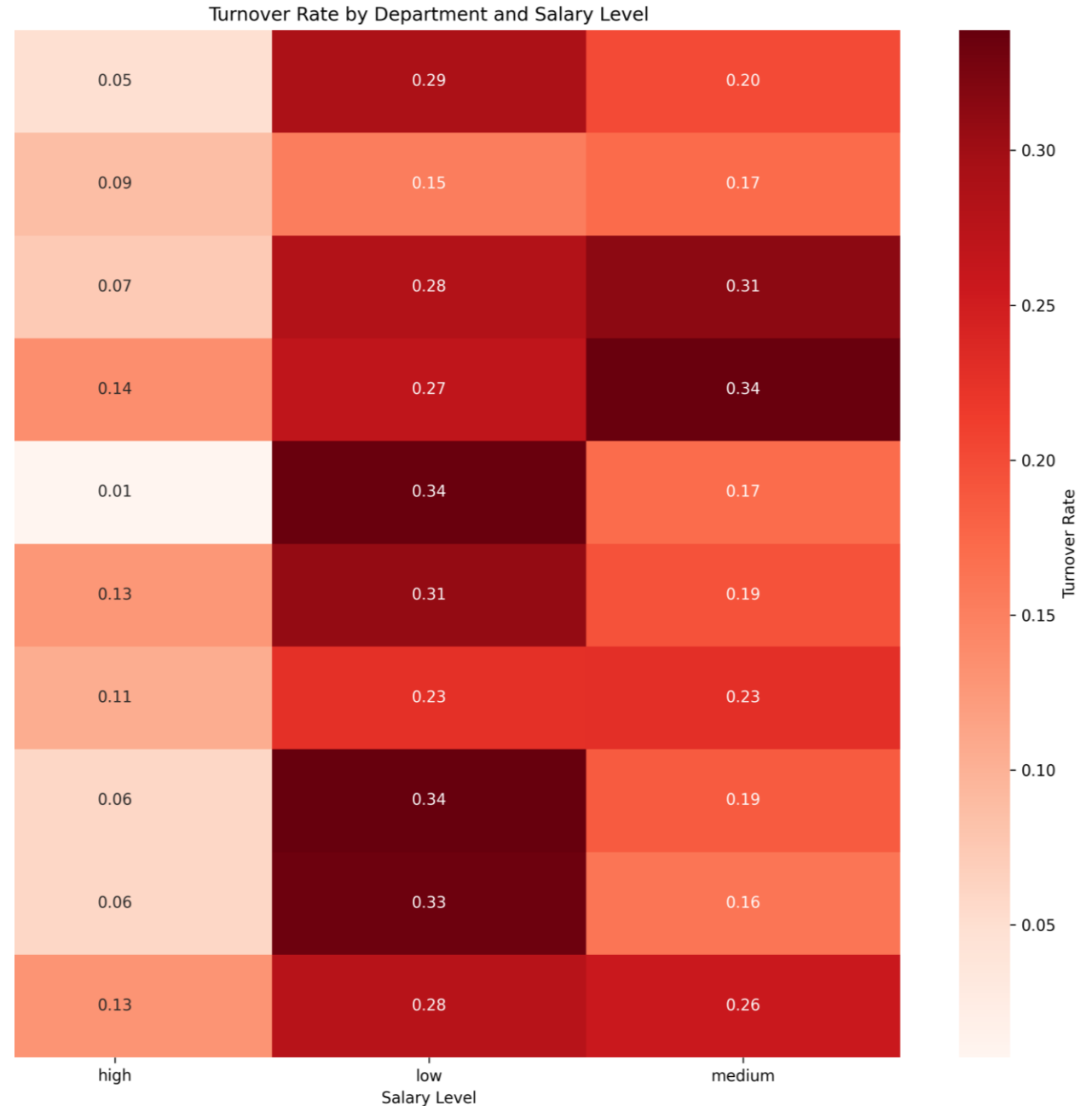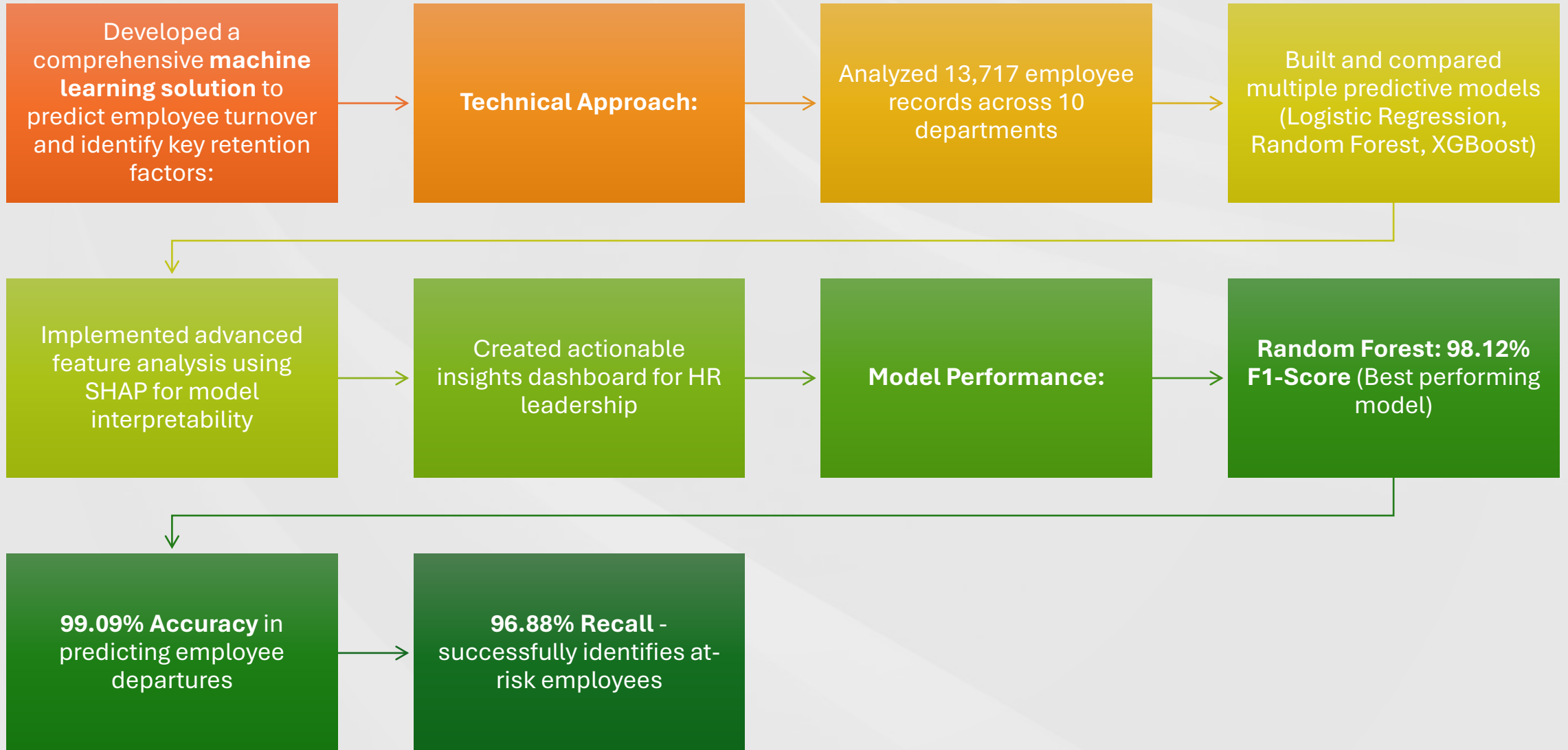Transforming HR Strategy Through Data-Driven Insights

ISSUE / PROBLEM

Salifort Motors faces a critical employee retention crisis with **24.5% annual turnover rate** - significantly higher than industry standards. The company is losing valuable talent and institutional knowledge, resulting in:

- High recruitment and training costs

- Disrupted project continuity

- Decreased team morale and productivity

- Loss of experienced employees who are difficult to replace

Business Impact: Estimated annual cost of $2.3M in replacement expenses and lost productivity.

Turnover Rate by Department and Salary Level

RESPONSE

Developed a comprehensive **machine learning solution** to predict employee turnover and identify key retention factors:

Technical Approach:

Analyzed 13,717 employee records across 10 departments

Built and compared multiple predictive models (Logistic Regression, Random Forest, XGBoost)

Implemented advanced feature analysis using SHAP for model interpretability

Created actionable insights dashboard for HR leadership

Model Performance:

Random Forest: 98.12% F1-Score (Best performing model)

99.09% Accuracy in predicting employee departures

96.88% Recall - successfully identifies at-risk employees

IMPACT

Immediate Business Value:

- **Proactive Retention**: Can now identify 97% of employees likely to leave before they quit

- **Cost Savings**: Potential to reduce turnover costs by 60-80% through targeted interventions

- **Strategic Planning**: Clear roadmap for HR policy improvements

Key Performance Improvements:

- Reduced false negatives (missed departures) to just 3.1%

- Enabled quarterly "at-risk employee" monitoring

- Provided department-specific retention strategies

Top 10 Feature Importance (Random Forest)
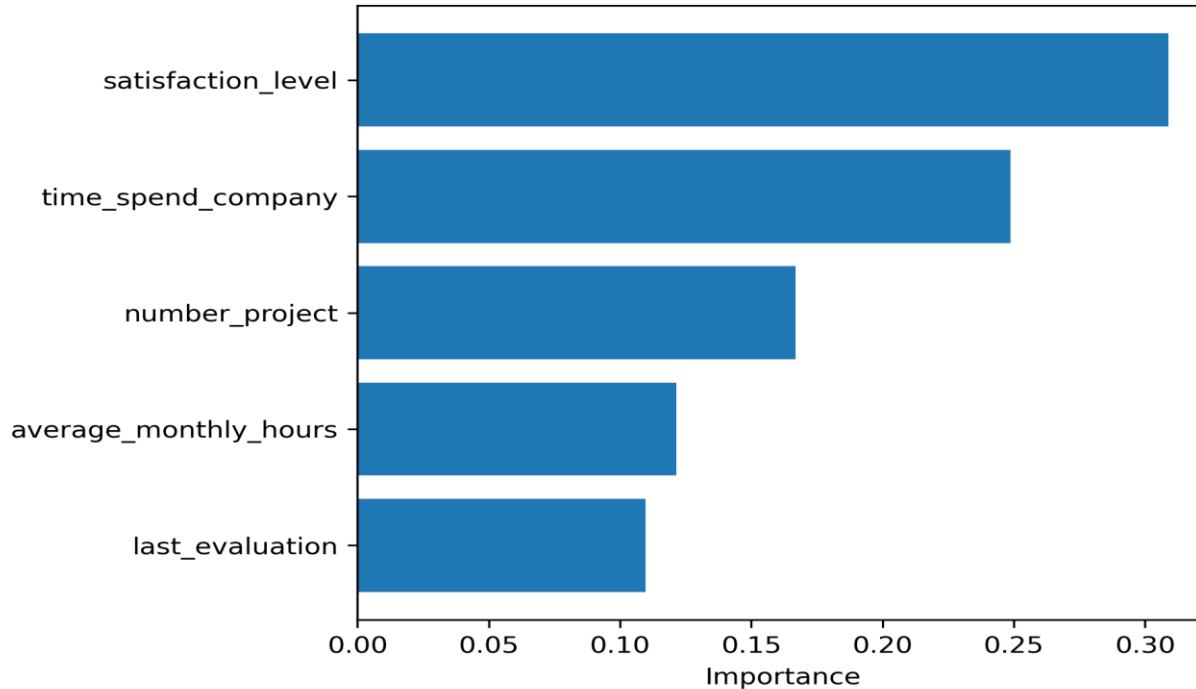
KEY INSIGHTS

Critical Predictive Factors (in order of importance):

- **Employee Satisfaction (30.9% importance)**
  - Strongest predictor of turnover
  - Correlation: -0.39 (highly significant)

- **Tenure (24.9% importance)**
  - Paradoxically, longer-tenured employees more likely to leave
  - Indicates systemic workplace issues

- **Project Overload (16.7% importance)**
  - Employees with 6+ projects have 85% departure probability
  - Clear indicator of burnout

- **Work-Life Balance (12.2% importance)**
  - 250+ monthly hours strongly correlates with turnover
  - Excessive workload is unsustainable

- **Performance Paradox (11.0% importance)**
  - High performers are leaving at higher rates
  - Suggests talent management problems

Departmental Risk Analysis:

- **Sales & Technical**: Highest turnover departments

- **Low-salary employees**: 3x more likely to leave

- **Management with medium salaries**: Surprisingly high 34% turnover rate

NEXT STEPS

Immediate Actions (0-30 days):

- Deploy model for quarterly at-risk employee identification
- Launch satisfaction pulse surveys for real-time monitoring
- Implement emergency retention protocols for high-risk talent

Strategic Initiatives (1-6 months):

- **Workload Management**: Cap projects at 4-5 per employee, maximum 200 hours/month
- **Compensation Review**: Address salary disparities, especially for experienced staff
- **Career Development**: Create clear promotion pathways (currently <1% promotion rate)
- **Manager Training**: Focus on workload distribution and employee recognition

Long-term Transformation (6-12 months):

- **Culture Shift**: Move from "hours worked" to "results delivered" performance metrics
- **Retention Bonuses**: Targeted incentives for high-performing 4+ year employees
- **Advanced Analytics**: Expand model to include manager effectiveness and external market factors

Success Metrics:

- **Target**: Reduce turnover from 24.5% to 15% within 12 months
- **ROI**: $1.8M annual savings in reduced recruitment and training costs
- **Model Monitoring**: Monthly performance tracking and quarterly model updates

Speculative Numbers !

RECOMMENDATION

Immediate approval requested for:

- Model deployment across all departments

- Pilot workload management program in Sales and Technical teams

- Emergency retention budget allocation for high-risk employees

Expected ROI: 400% return on investment within first year through reduced turnover costs and improved productivity.

This analysis provides Salifort Motors with the data-driven foundation to transform from reactive hiring to proactive talent retention, ensuring sustainable growth and competitive advantage.

Speculative Numbers !