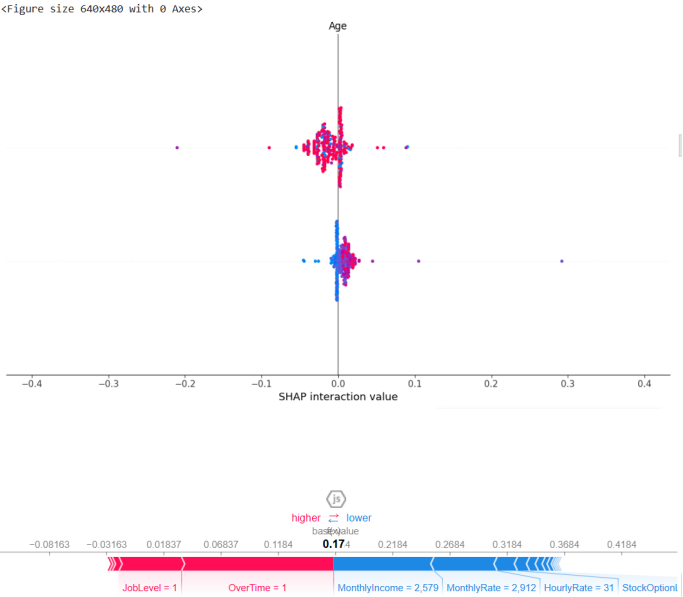# Model Accuracy & Attrition Prevention Report

1. Model Performance Summary

Two models were tested:

- Logistic Regression:

  - Accuracy: 0.88

  - Precision (1): 0.67 | Recall: 0.15 | F1: 0.25

- Decision Tree:

  - Accuracy: 0.83

  - Precision (1): 0.27 | Recall: 0.15 | F1: 0.20

Low recall in both highlights challenges in predicting attrition cases.

2. Confusion Matrices


3. SHAP Feature Importance

Top factors affecting attrition include Overtime, Monthly Income, and Job Level. The SHAP plots below visualize the most impactful features.

```
Decision Tree Accuracy: 0.8333333333333334
[[239  16]
 [ 33   6]]
              precision    recall  f1-score   support

           0       0.88      0.94      0.91       255
           1       0.27      0.15      0.20        39

    accuracy                           0.83       294
   macro avg       0.58      0.55      0.55       294
weighted avg       0.80      0.83      0.81       294
```

```
Accuracy: 0.8775510204081632
[[252   3]
 [ 33   6]]
              precision    recall  f1-score   support

           0       0.88      0.99      0.93       255
           1       0.67      0.15      0.25        39

    accuracy                           0.88       294
   macro avg       0.78      0.57      0.59       294
weighted avg       0.86      0.88      0.84       294
```


Confusion Matrix

Decision Tree - Confusion Matrix
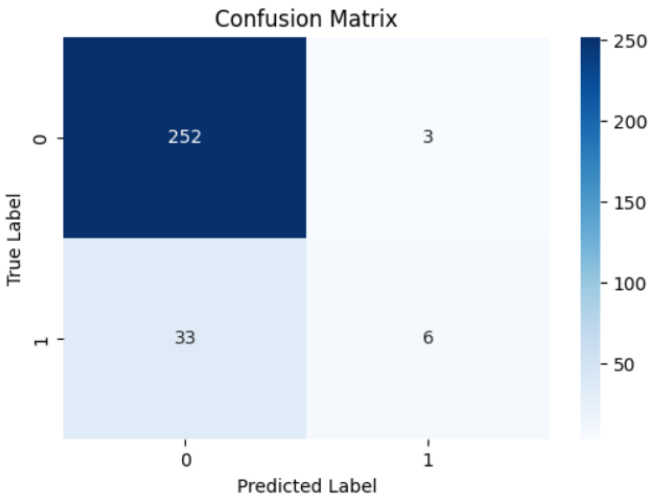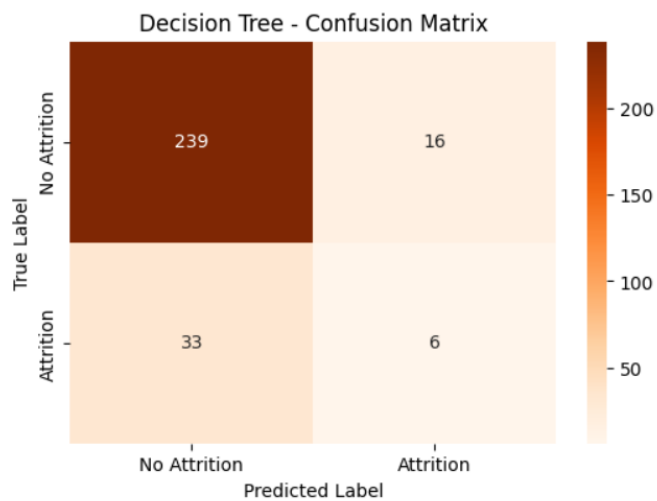
4. Attrition Prevention Suggestions

Recommendations based on model insights:

1. Reduce employee overtime.

2. Improve promotion frequency for stagnant roles.

3. Enhance compensation for lower income bands.

4. Provide mentorship and regular performance reviews.

5. Create alert systems for at-risk employee profiles.

Data-driven HR actions can reduce attrition significantly.