

MODEL ACCURACY REPORT

LOGISTIC REGRESSION MODEL FOR ANALYZING HR ATTRITION DATA

1. OBJECTIVE

To develop a predictive model using Logistic Regression to classify whether an employee is likely to leave the company (Attrition), based on various demographic and job-related features.

2. DATASET OVERVIEW

- **Dataset Name:** WA_Fn-UseC_-HR-Employee-Attrition.csv
- **Target Variable:** Attrition (binary: Yes = 1, No = 0)
- **Preprocessing Applied:**
 - ✓ Dropped non-informative columns: EmployeeCount, Over18, StandardHours, EmployeeNumber
 - ✓ Label Encoding for categorical variables
 - ✓ Standard scaling for numerical features
 - ✓ Recursive Feature Elimination (RFE) for feature selection (15 features selected)

3. MODEL CONFIGURATION

- **Algorithm:** Logistic Regression (solver='liblinear')
- **Class Weighting:** Balanced to handle class imbalance
- **Hyperparameter Tuning:** GridSearchCV (5-fold cross-validation)
 - ✓ **C (Regularization):** [0.01, 0.1, 1, 10]
 - ✓ **Penalty:** ['l1', 'l2']
- **Evaluation Metric (during Grid Search):** F1 Score

4. TEST SET EVALUATION

After selecting the best model via grid search, the final model was evaluated on the test set.

5. OVERALL ACCURACY

The overall accuracy was found to be **73.47%**. The model correctly classified **73.5%** of employees regarding whether they would leave.

6. CONFUSION MATRIX

```
Confusion Matrix:  
[[178  69]  
 [  9  38]]
```

- **True Positives (TP):** 38
- **True Negatives (TN):** 178
- **False Positives (FP):** 69
- **False Negatives (FN):** 9

7. CLASSIFICATION REPORT

```
Classification Report:  
              precision    recall  f1-score   support  
  
     0           0.95        0.72        0.82         247  
     1           0.36        0.81        0.49          47  
  
 accuracy           0.73         294  
 macro avg           0.65         294  
 weighted avg           0.86         294
```

Metric	No (0)	Yes (1)
Precision	0.95	0.36
Recall	0.72	0.81
F1-Score	0.82	0.49
Support	247	47

Averages:

- **Macro Avg F1-Score:** 0.66
- **Weighted Avg F1-Score:** 0.77

5. INSIGHTS

- High Recall for "Yes" (Attrition): **0.81**
- The model successfully identifies **81%** of actual leavers.
- High Precision for "No" (Stayers): **0.95**
- Confident predictions when labeling an employee as staying.