

AI Agent Report: Mental Health Risk Detection Using Survey Data

I. Problem Statement

Mental health is a growing concern in professional environments. Many individuals struggle with mental health issues but hesitate to seek help. This AI agent analyzes survey data to predict whether a person is at risk and may need mental health treatment based on their responses to various workplace and personal factors.

II. Tools & Libraries Used

Python, Pandas, NumPy, Scikit-learn, Joblib

III. How It Works

1. Data Cleaning: Removes unnecessary columns and fills missing values.
2. Label Encoding: Converts text data into numerical format.
3. Feature Scaling: Standardizes the features using StandardScaler.
4. Model Training: A Random Forest Classifier is trained on the cleaned dataset.
5. Evaluation: The model is evaluated using accuracy, classification report, and confusion matrix.
6. User Input: The system collects real-time user input, processes it, and predicts the need for mental health treatment.
7. Recommendations: Based on the prediction, users receive actionable suggestions.

IV. Data Analysis Performed

1. Data Loading: Used pandas to load the CSV.
2. Data Cleaning: Dropped irrelevant columns and filled missing values.
3. Categorical Encoding: Encoded text data using LabelEncoder.

4. Feature/Target Definition: Features (X), Target (y=treatment).
5. Train-Test Split: Split into 80% training and 20% testing.
6. Feature Scaling: Standardized values using StandardScaler.
7. Model Training: Trained using RandomForestClassifier.
8. Evaluation: Used classification_report and confusion_matrix.
9. User Inference: Accepts new inputs, transforms them, and predicts treatment needs.

V. Prediction Model: Random Forest Classifier

The core of your AI Agent is a **Random Forest Classifier**, a robust ensemble learning algorithm used for classification tasks.

How the Model is Used in This Project:

1. **Input Features:**
The model uses 23 features (like gender, remote work status, company size, mental health interview policies, etc.) and one numerical feature (Age).
2. **Target Variable:**
treatment – This binary variable indicates whether a person has sought mental health treatment (Yes = 1, No = 0).
3. **Data Preparation:**
 - **Missing Values:** Filled with "Unknown" for certain fields
 - **Label Encoding:** Converts categorical values (e.g., "Yes", "No") to numeric codes
 - **Standard Scaling:** Normalizes the feature values for better model performance
4. **Model Training:**
 - Used RandomForestClassifier(n_estimators=100, random_state=42)
 - Trained on 80% of the dataset
 - Evaluated on 20% test set
5. **Prediction:**
 - The model predicts 1 if a person **is likely to need** mental health treatment
 - It predicts 0 if the person is **less likely to need** treatment
6. **Model Evaluation:**
 - **Classification Report:** Precision, Recall, F1-score for each class
 - **Confusion Matrix:** Shows correct vs incorrect predictions

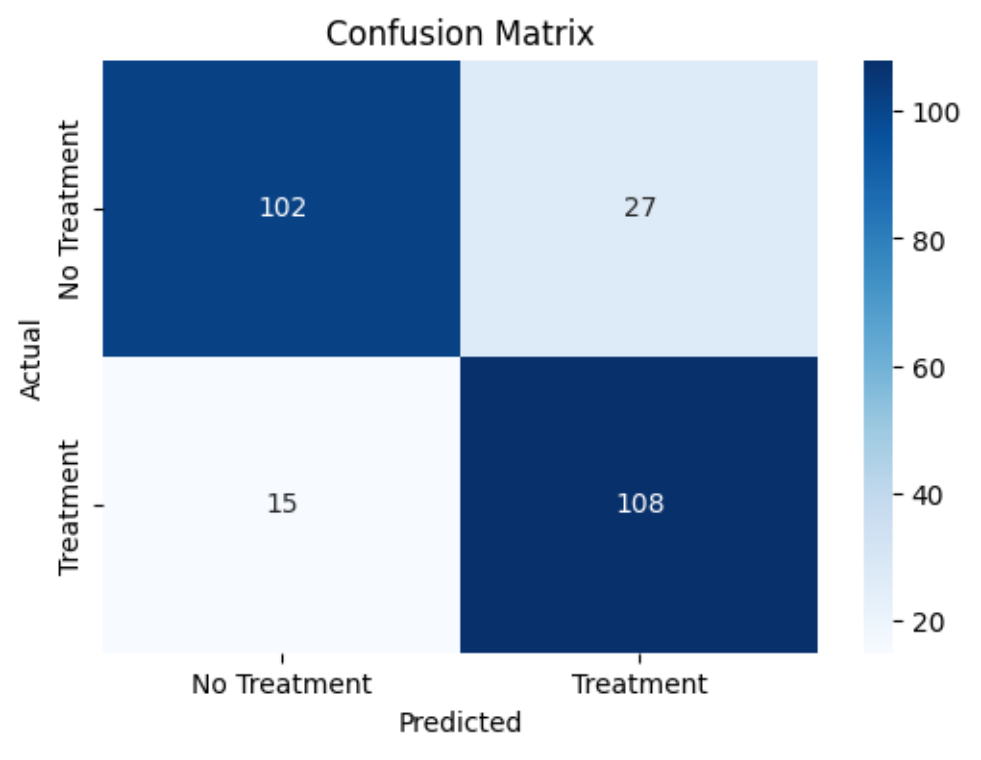
VI. Performance Analysis

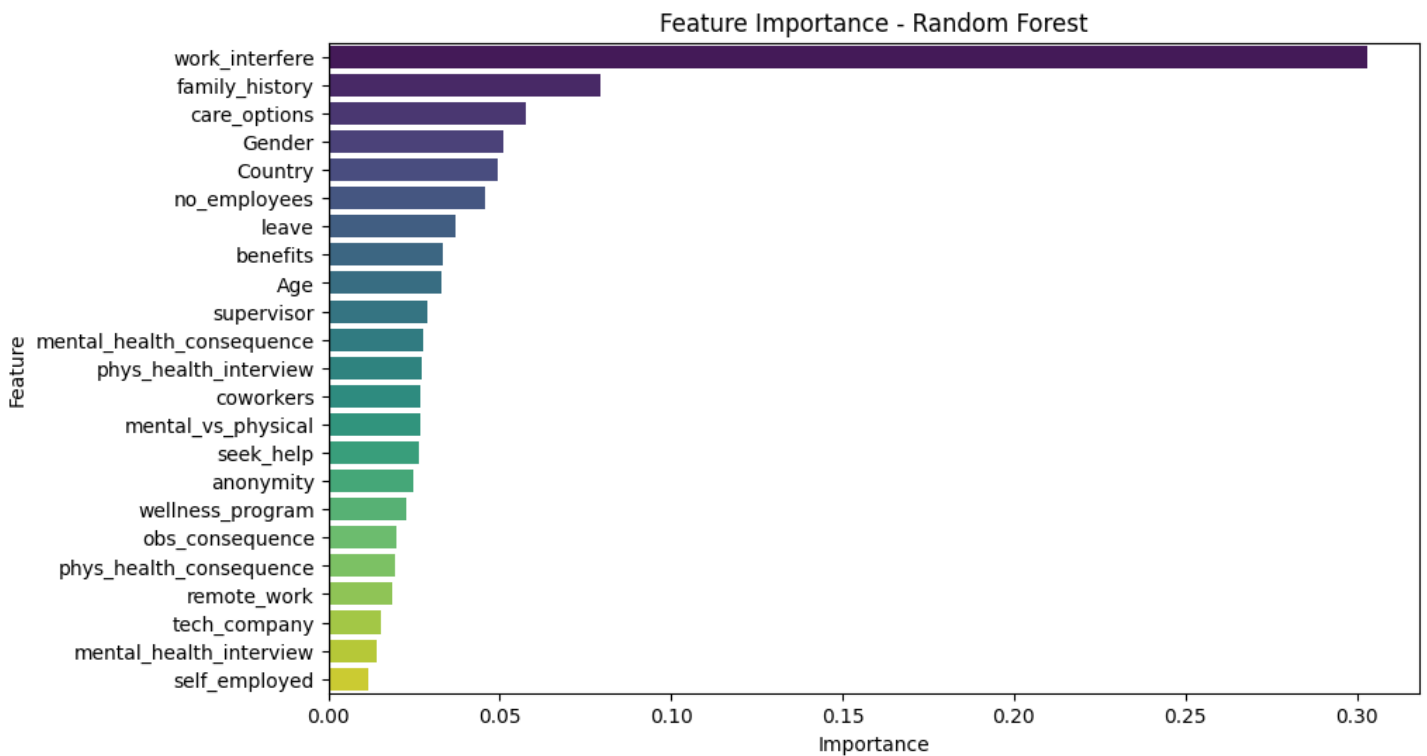
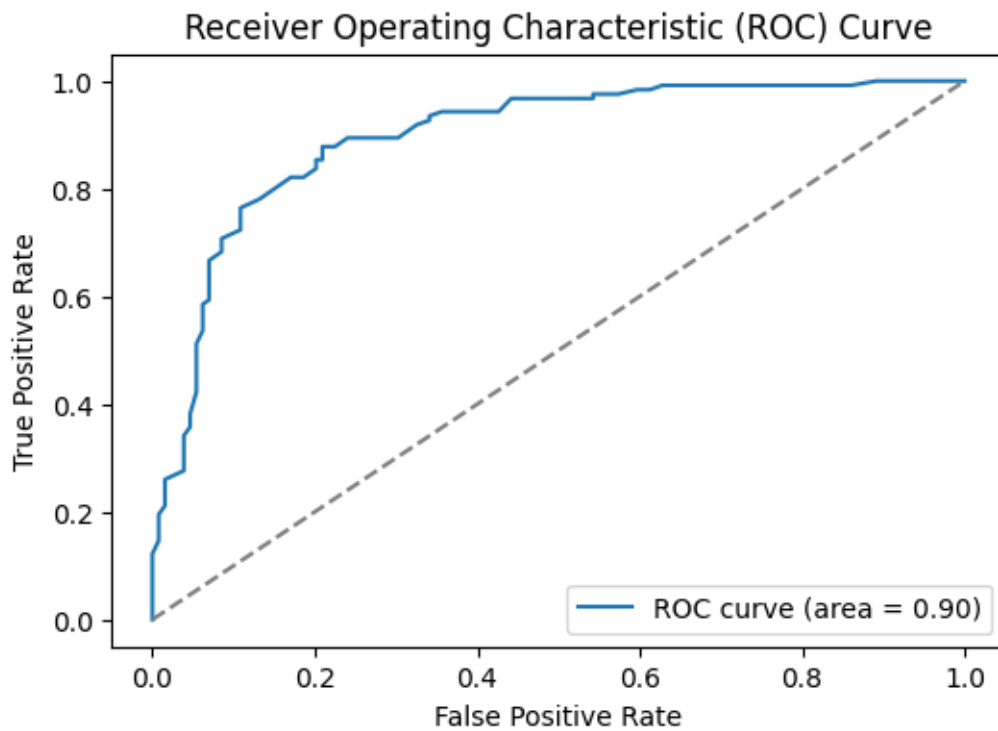
1. Accuracy: 0.8333
2. Precision: 0.8000
3. Recall: 0.8780
4. F1-score: 0.8372

Classification Report:

CLASS	PRECISION	RECALL	F1 SCORE	SUPPORT
0 (No Treatment)	0.87	0.79	0.83	129
1 (Yes Treatment)	0.80	0.88	0.84	123
Macro Avg	0.84	0.83	0.83	252
Weighted Avg	0.84	0.83	0.83	252

Graphs:





VII. Output Example

Prediction: Yes (Needs treatment)

Recommendation: Speak to a professional, join wellness programs, manage stress better.

VIII. Conclusion

This AI agent serves as a simple, real-time assistant to help people assess mental health risks based on their background and work environment. It encourages early detection and action to improve well-being.

IX. Future Scope

Include deep learning models, integrate with web/mobile apps, expand features, improve interpretability.