

Mental Health Analysis

A large, abstract, flowing graphic in the background, composed of overlapping translucent bands in shades of pink, purple, blue, and white, resembling liquid or a digital signal.

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How can we develop models to assess mental stress,
and which factors are most influential in predicting
mental health outcomes?

Contents

- INTRODUCTION
- DATASET OVERVIEW
- DATA PREPROCESSING
- SMART QUESTIONS
- MODELS AND EVALUATIONS
- CONCLUSION



Dataset Overview

Rows

292,364

Columns

17

Demographic	Health-Related
<ul style="list-style-type: none">• Gender• Country• Occupation• Self_Employed	<ul style="list-style-type: none">• Family_History• Treatment• Mental_Health_History• Growing_Stress <ul style="list-style-type: none">• Mood_Swings (Ordinal)• Coping_Struggles• Social_Weakness• Mental_Health_Interview
Behavioral or Activity-Related	Time
<ul style="list-style-type: none">• Days_Indoors (Ordinal)• Changes_Habits• Work_Interest• Care_Options	<ul style="list-style-type: none">• Timestamp

Data Preprocessing

Rows

-5,202



Columns

-3



**Missing Values
Handling**

Drop rows with NA

Self_Employed

**Drop Irrelevant
Columns**

Self_Employed
Timestamp
Country

**Feature
Transformation**

Categorical → Numerical

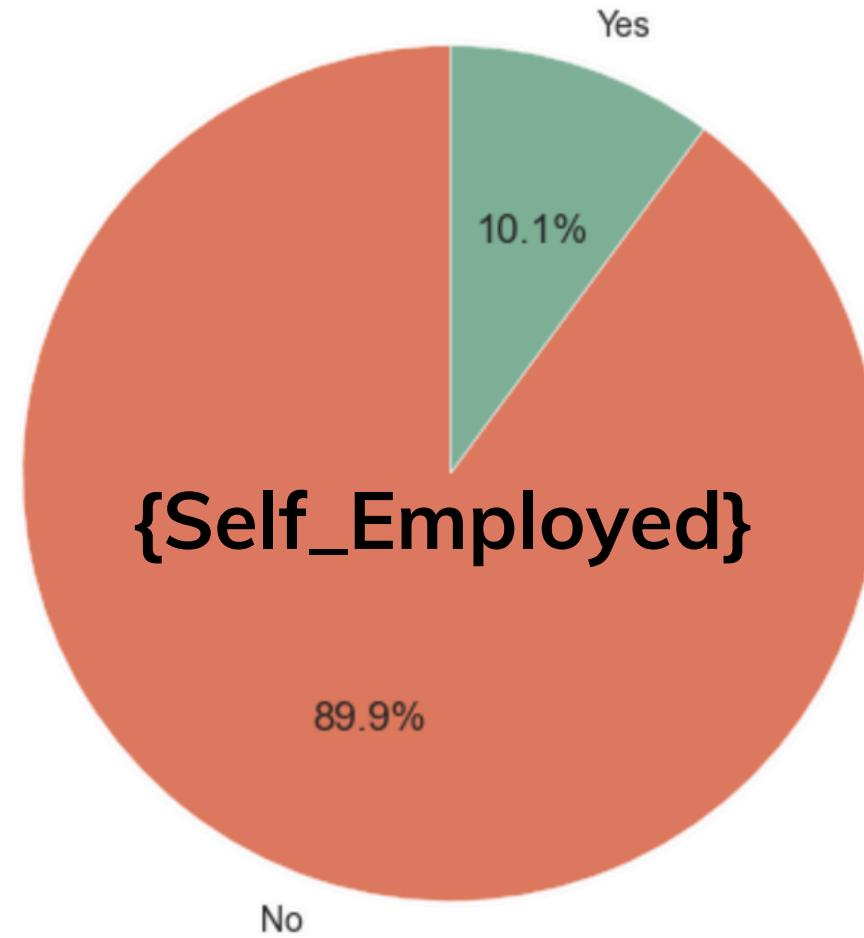
**One-Hot
Encoding**

Occupation

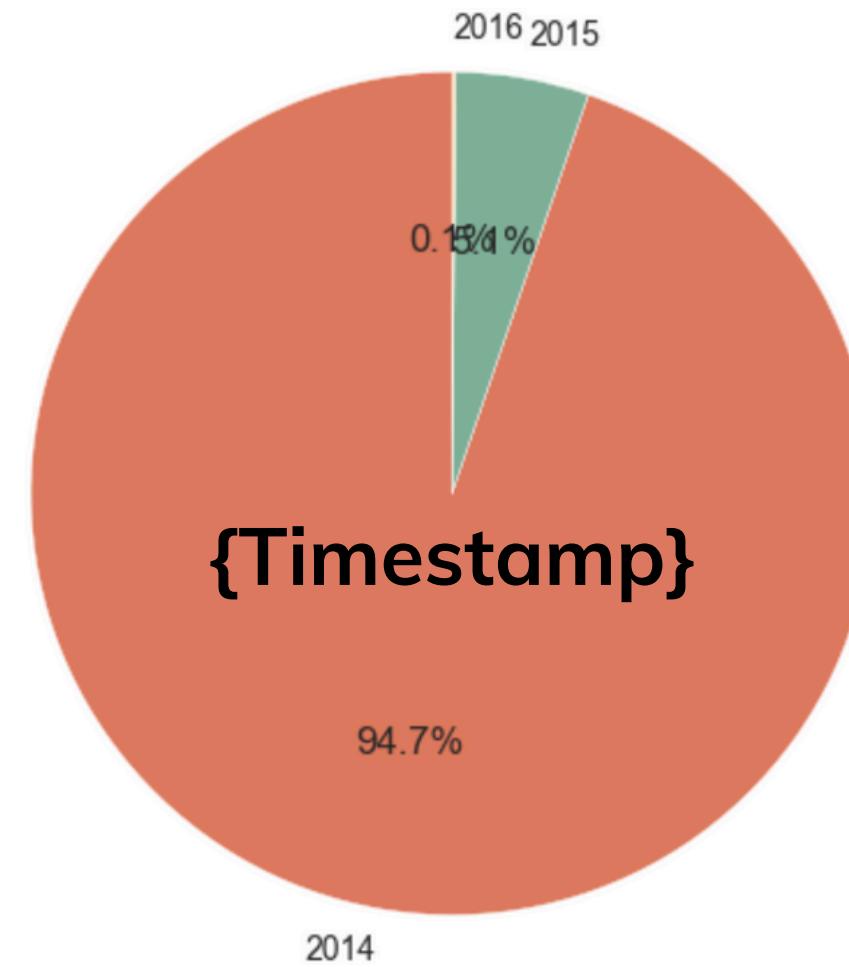
EDA & Statistical Testing

H_0 : {The feature} and Growing_Stress are independent.

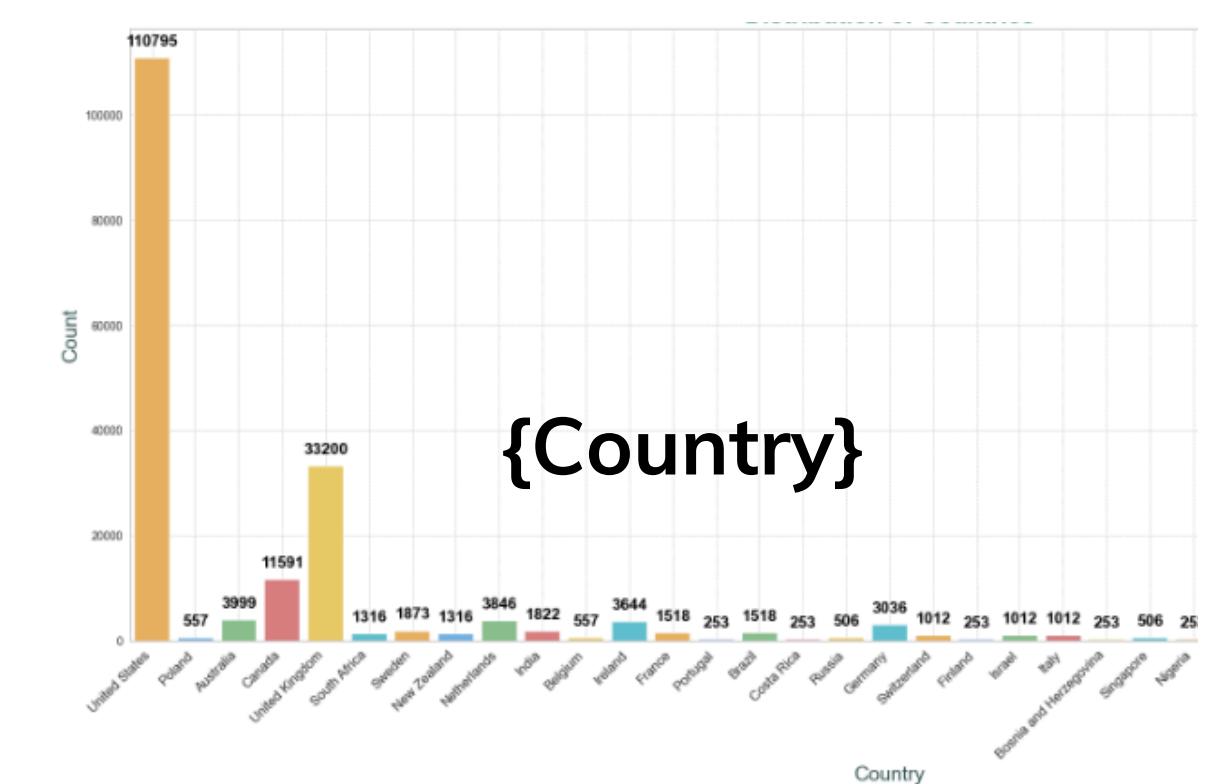
H_1 : {The feature} and Growing_Stress are not independent.



p-value = 0.15



p-value = 0.93



p-value = 0.99

Target Questions

Q1. What are the **top 5 factors** that influence the **growing stress**?

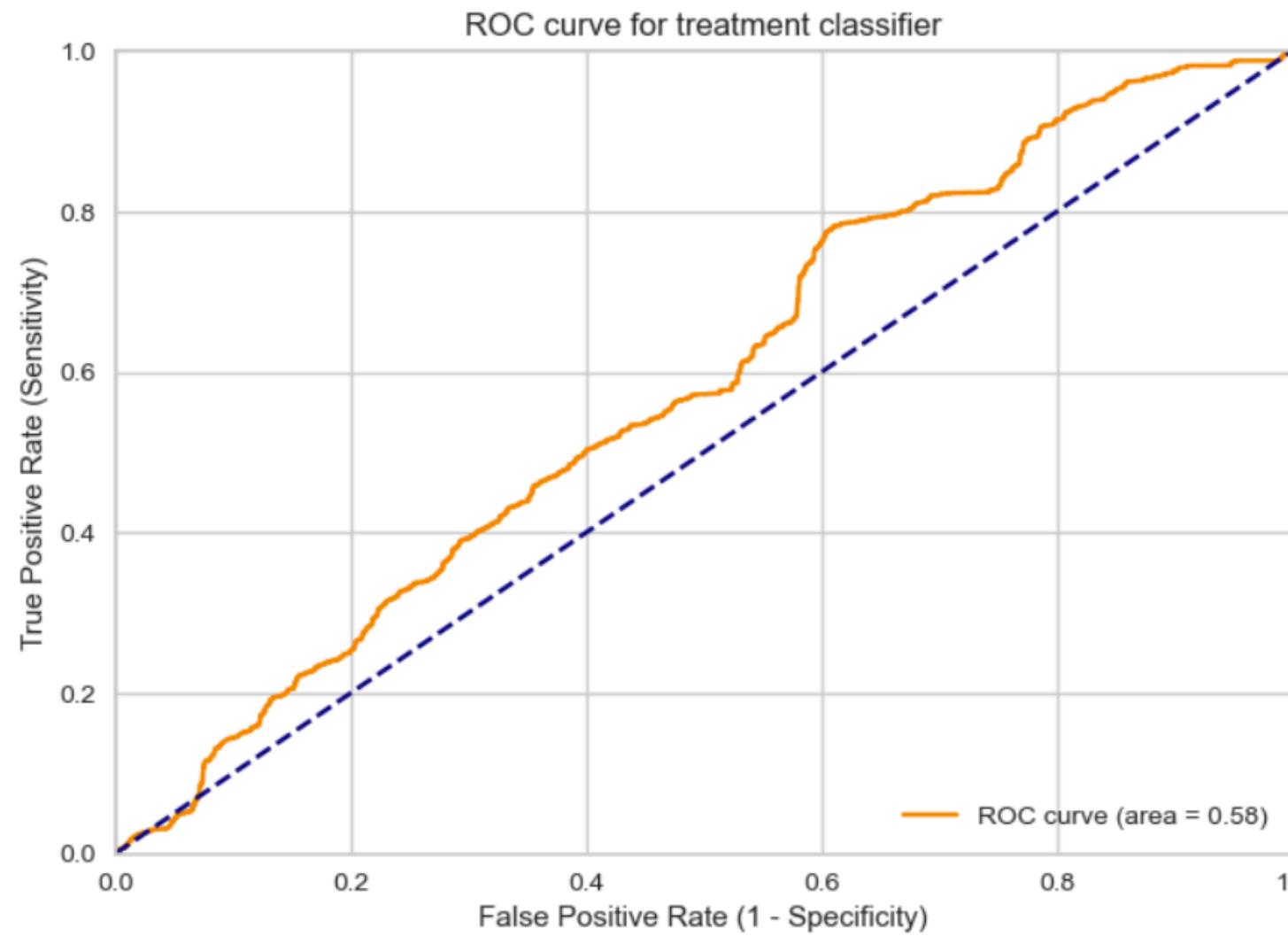
Q2. Do people with **family history** receive **treatment** or not?

Q3. What are the **factors** that impact the **growing stress for students**?

Q1. What are the top 5 factors that influence the growing stress?

A) Logistic Regression

Number of Features Selected : 16



Accuracy: 54%

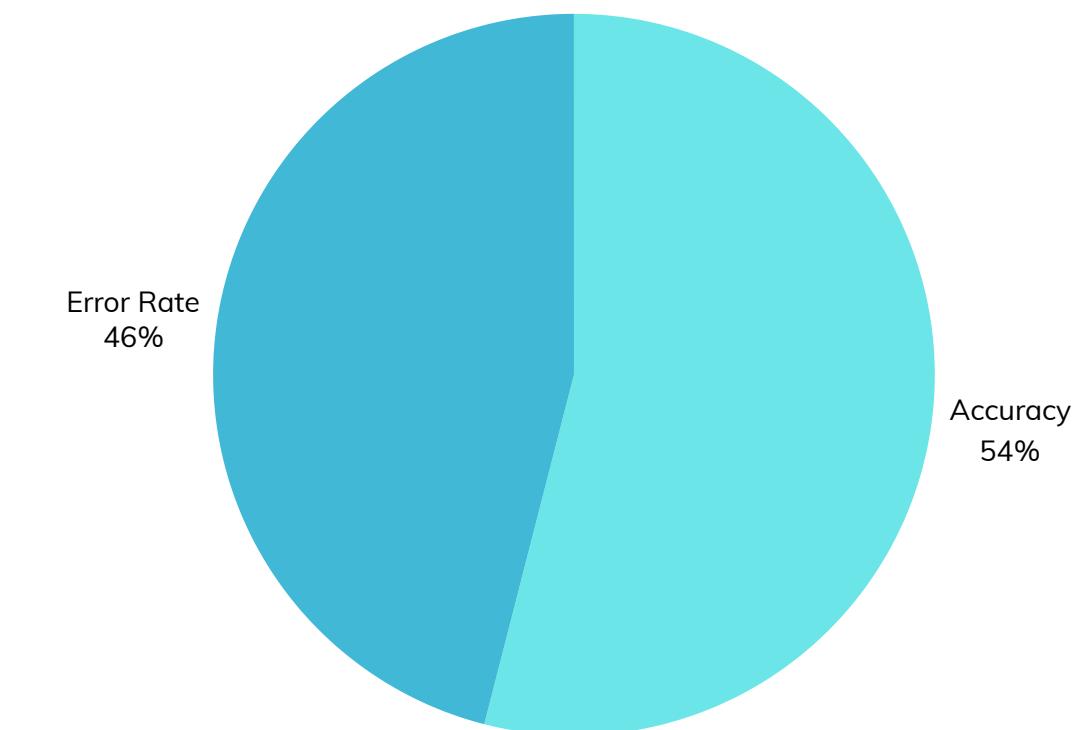
ROC: 0.58

Precision : 53%

Recall : 46%

F1- Score : 49%

Confusion Matrix	
Predicted	
0	8463
1	7486
	11973



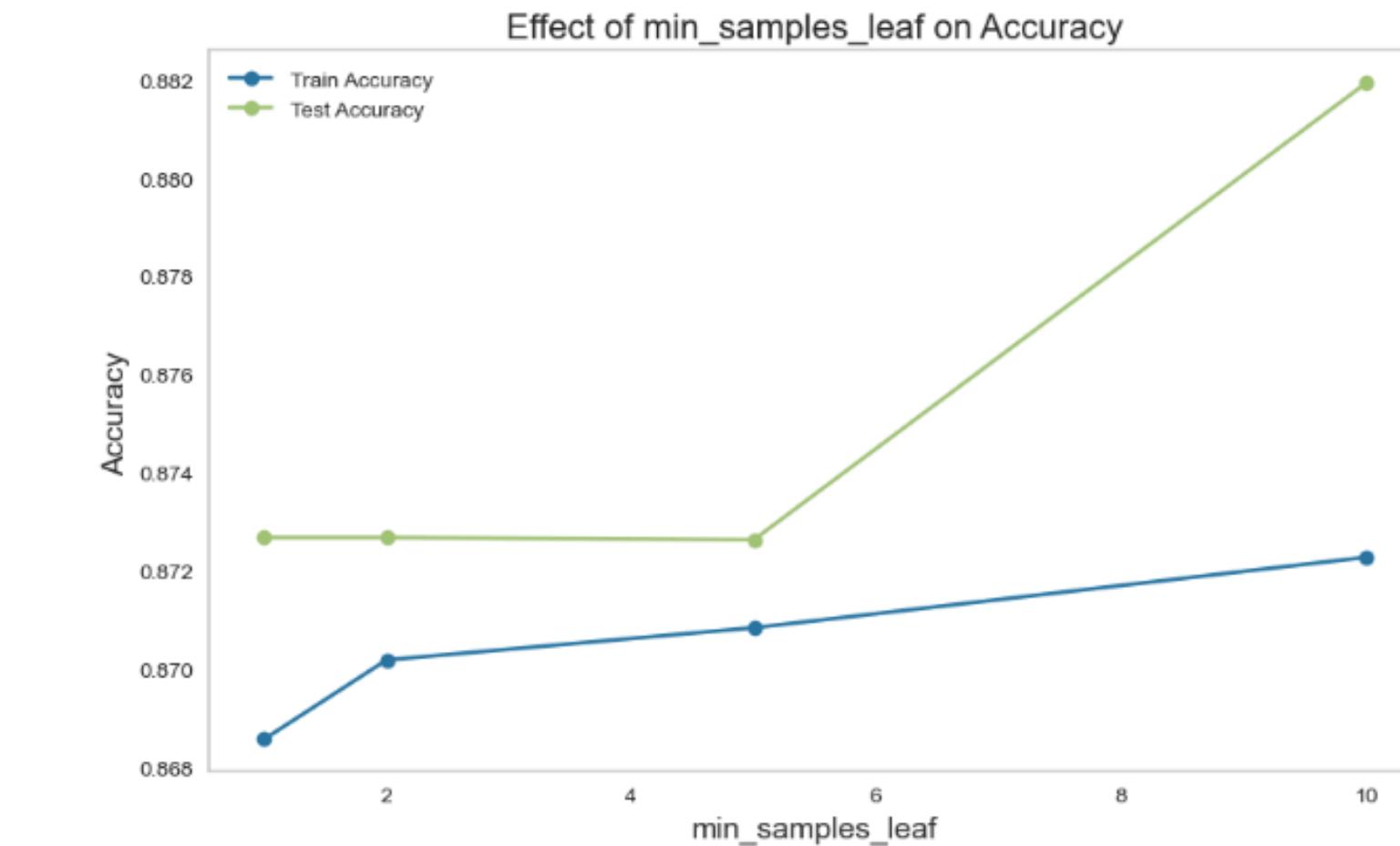
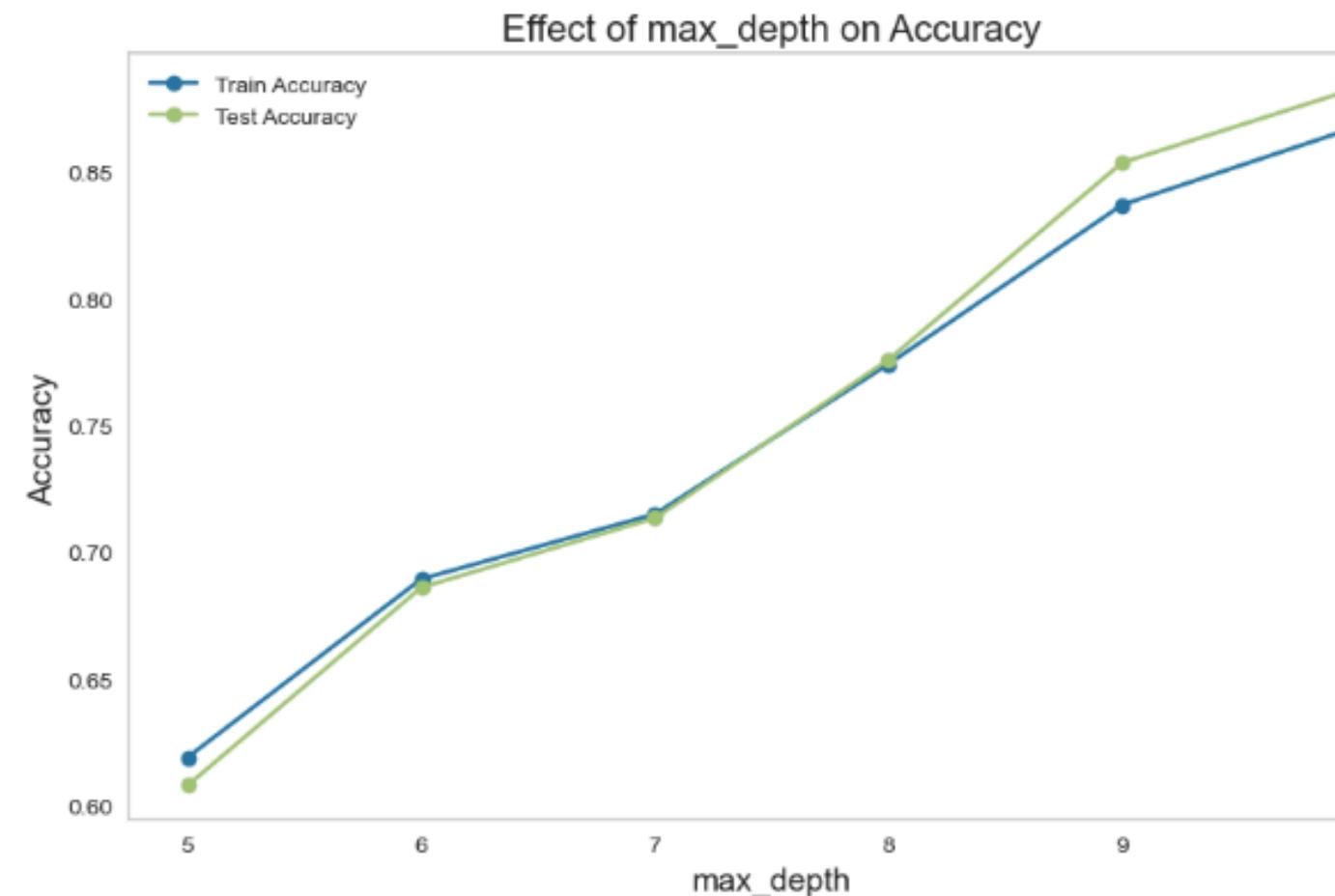
Q1. What are the top 5 factors that influence the growing stress?

B) Decision Tree

Number of Features Selected : 16

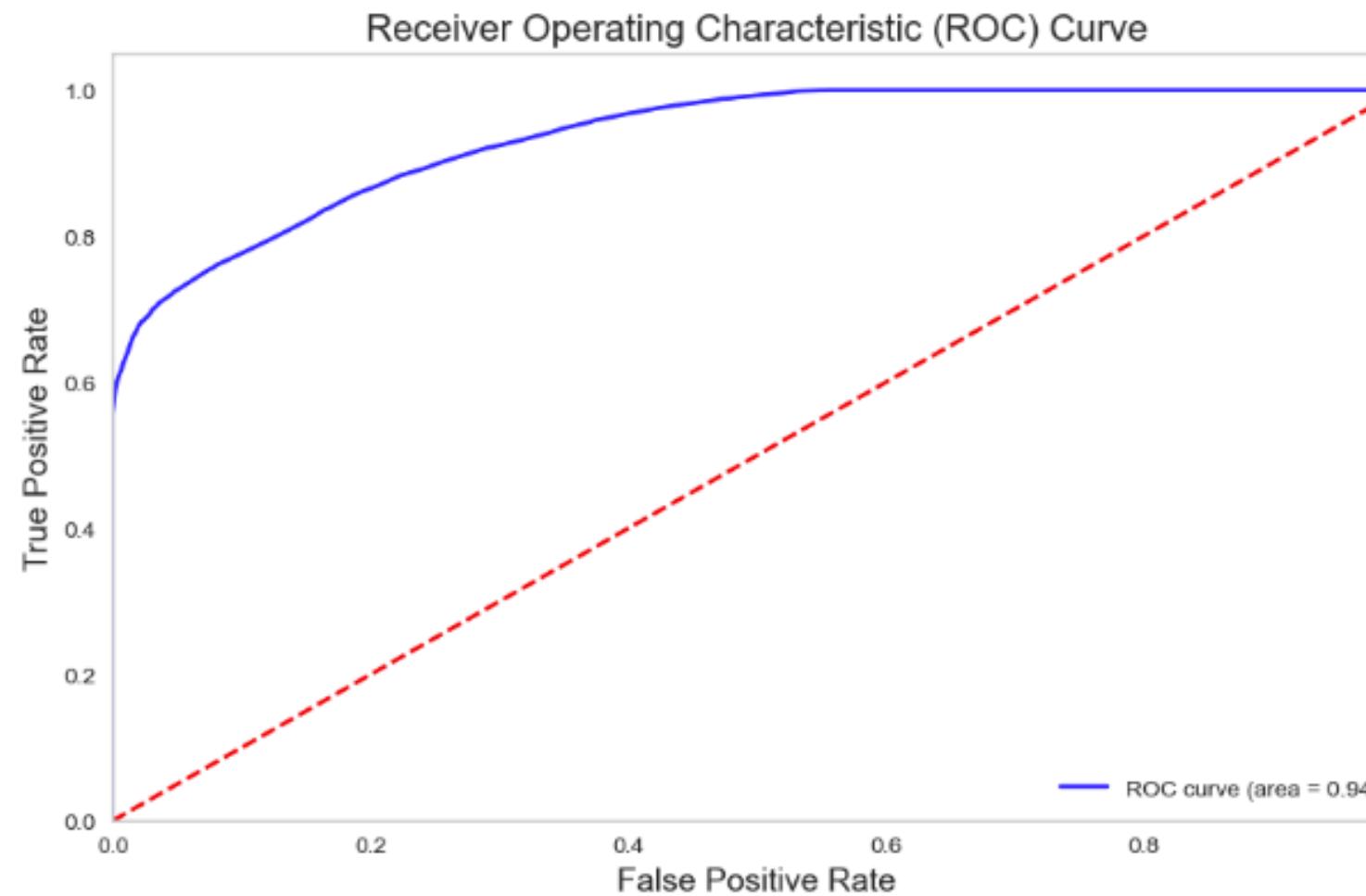
Hyperparameter Tuning

Depth of the Tree : 9
Min Samples Leaf : 10
Min Samples Split : 10



Q1. What are the top 5 factors that influence the growing stress?

B) Decision Tree



Train Accuracy: 83.7%

Test Accuracy : 83.4%

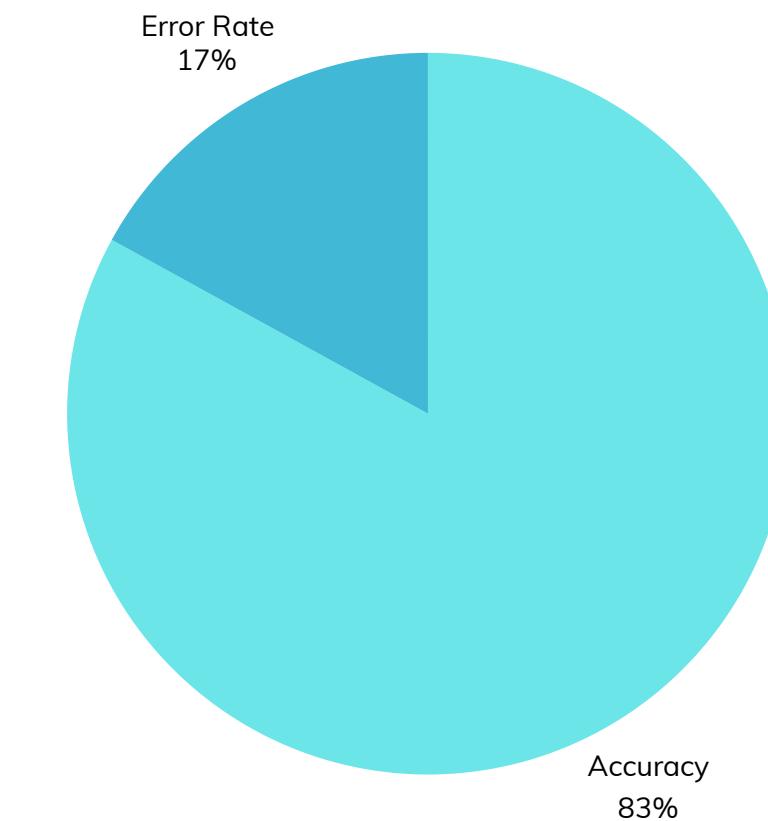
Precision: 80%

Recall : 87%

F1-score : 83%

ROC: 0.94

Confusion Matrix		
		Predicted
Actual	0	1
	15628	2393
	3854	15913



Q1. What are the top 5 factors that influence the growing stress?

C) Random Forest

Number of Features Selected : 16

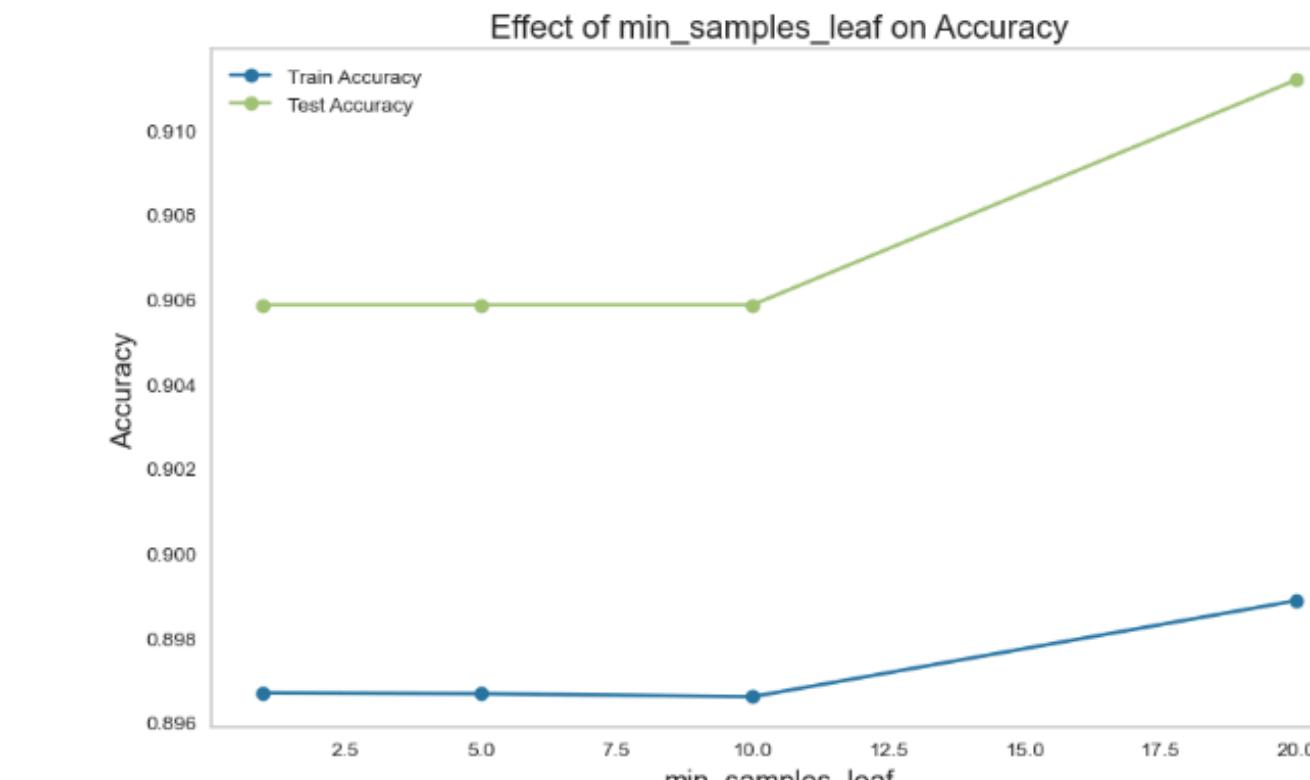
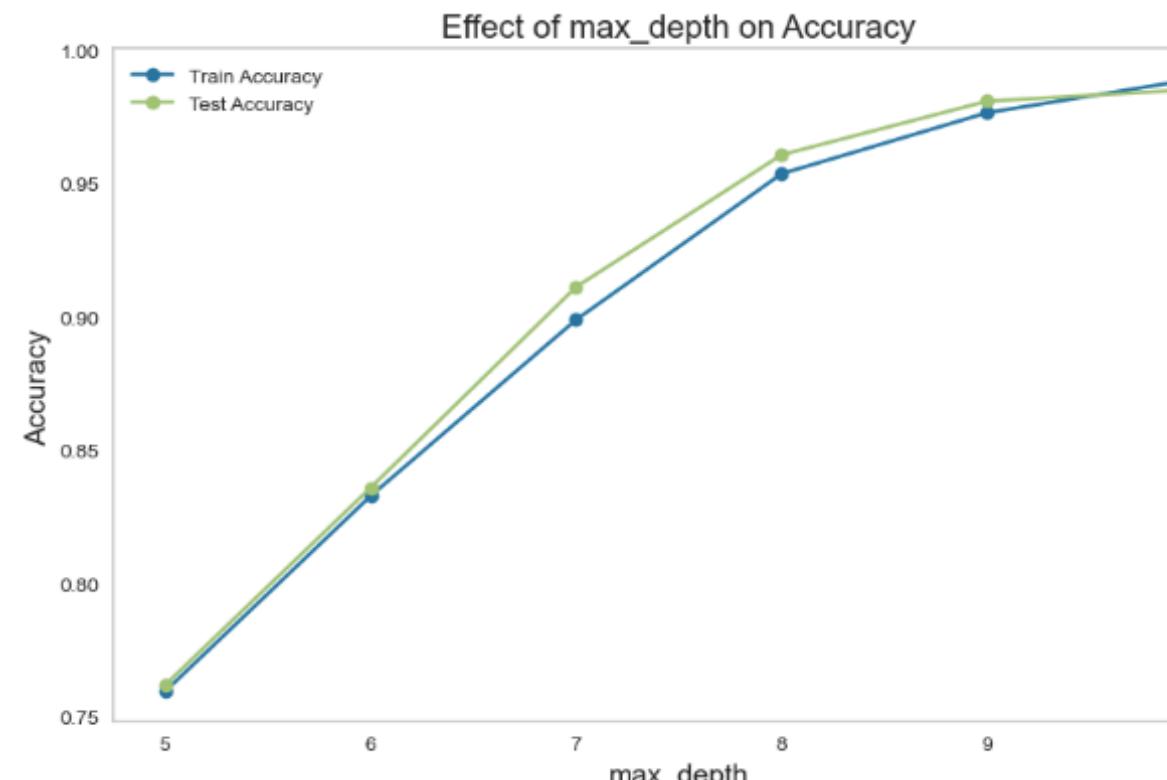
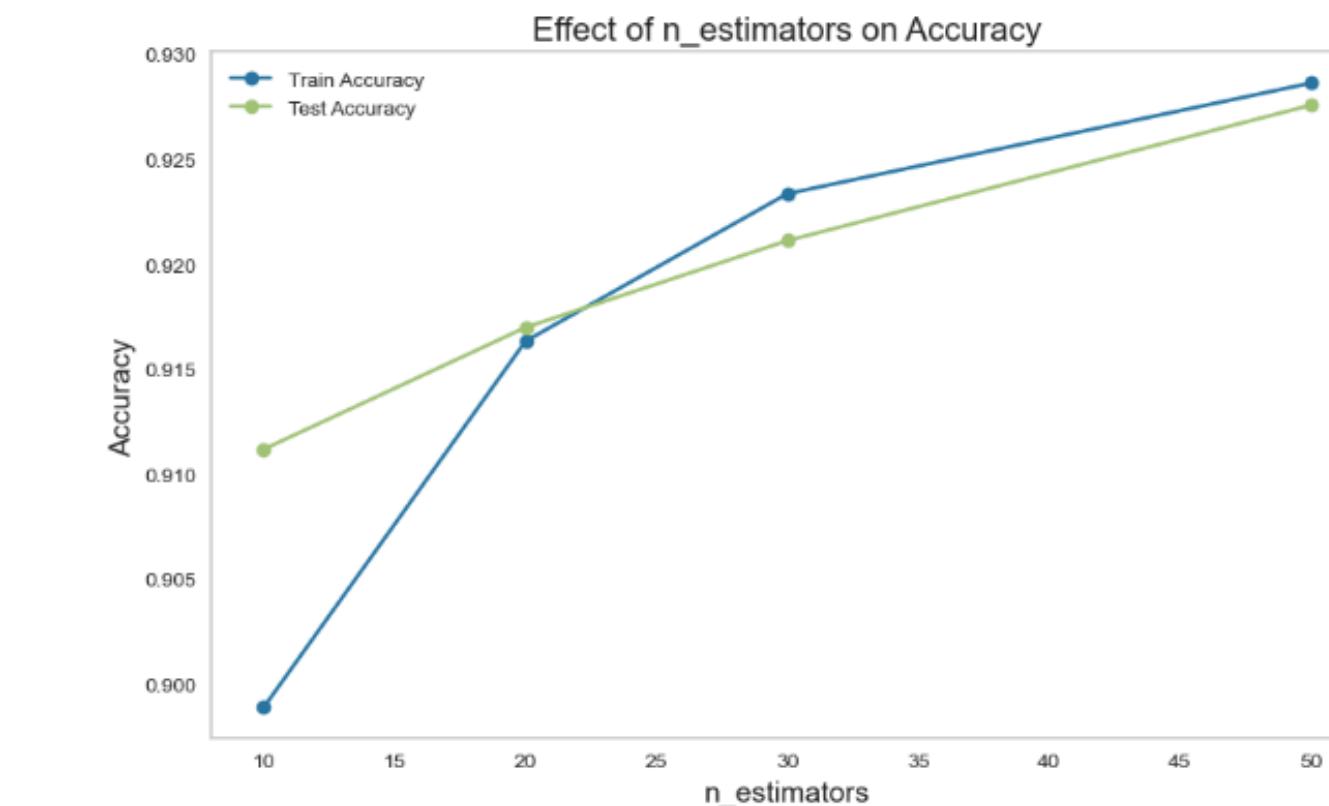
Hyperparameter Tuning

Depth of the Tree : 7

Min Samples Leaf : 20

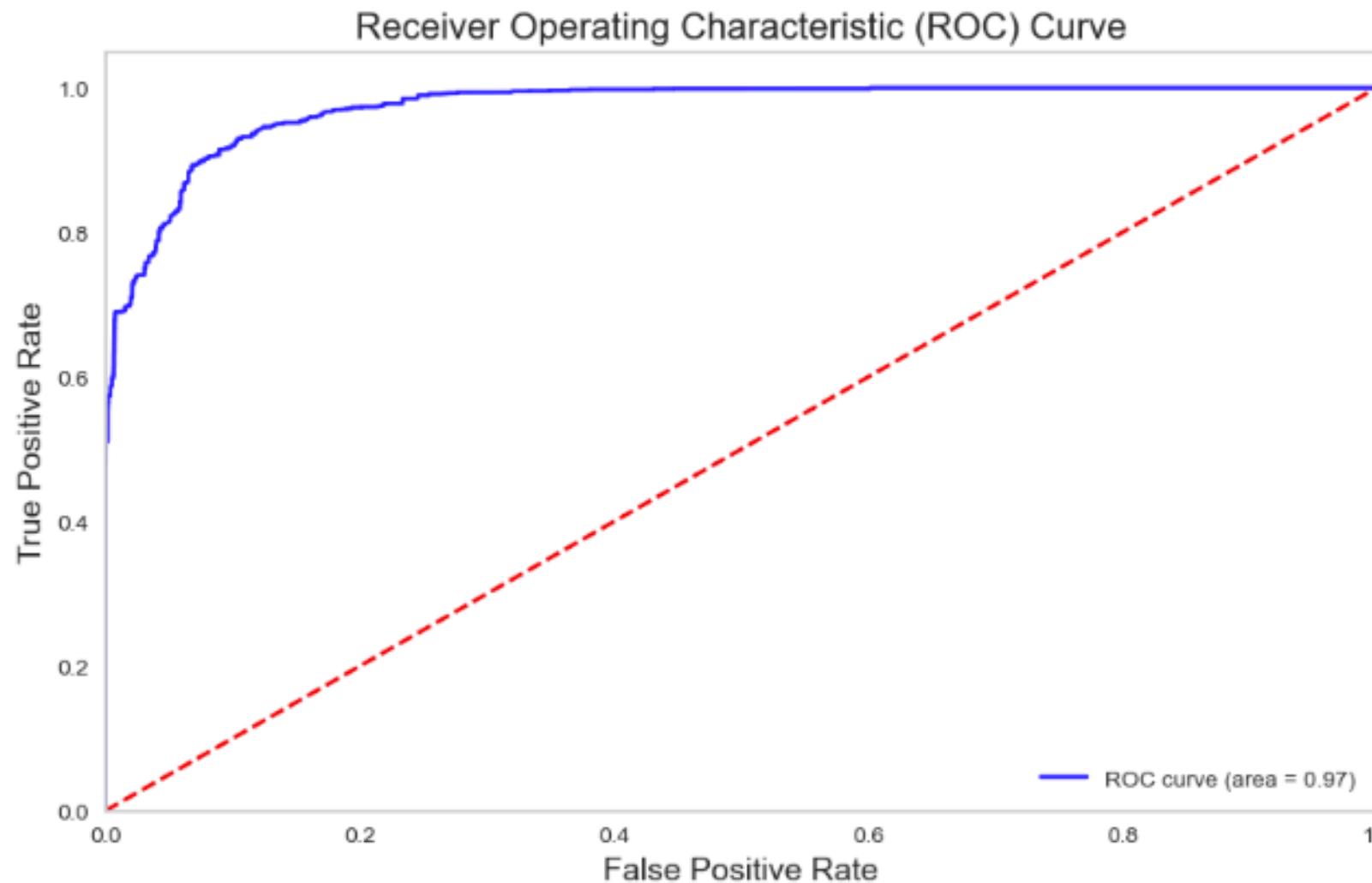
Min Samples Split : 20

N Estimators : 10



Q1. What are the top 5 factors that influence the growing stress?

C) Random Forest



Confusion Matrix	
Predicted	
0	16097
1	1388
Actual	
0	1924
1	18379

Train Accuracy: 91.1%

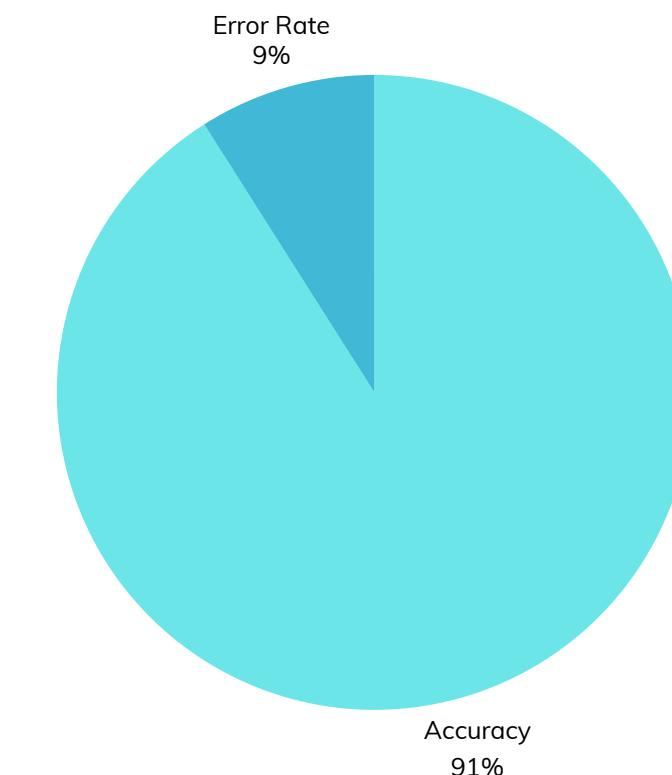
Test Accuracy : 91.2%

Precision: 92%

Recall : 89%

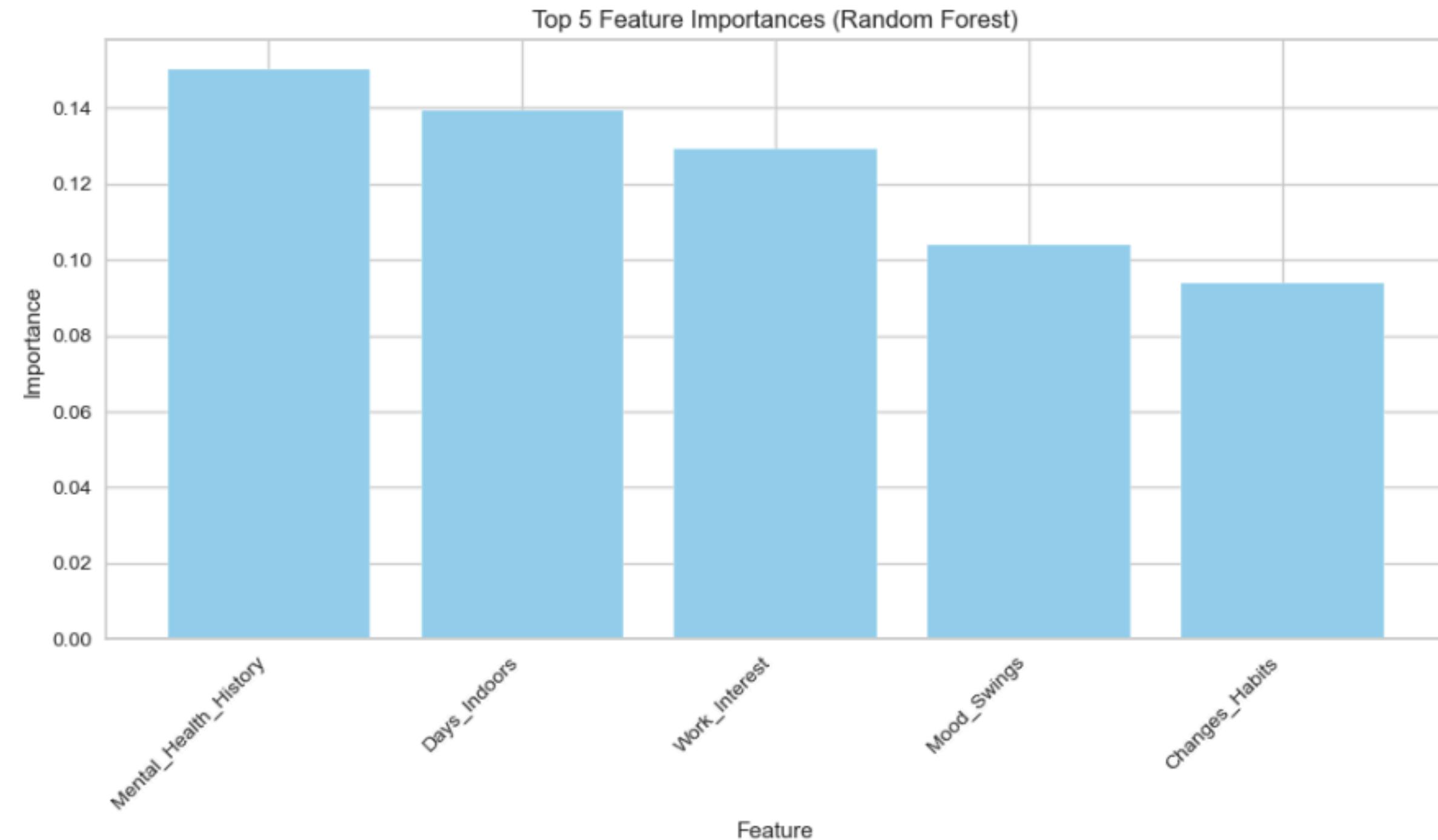
F1-score : 91%

ROC: 0.97



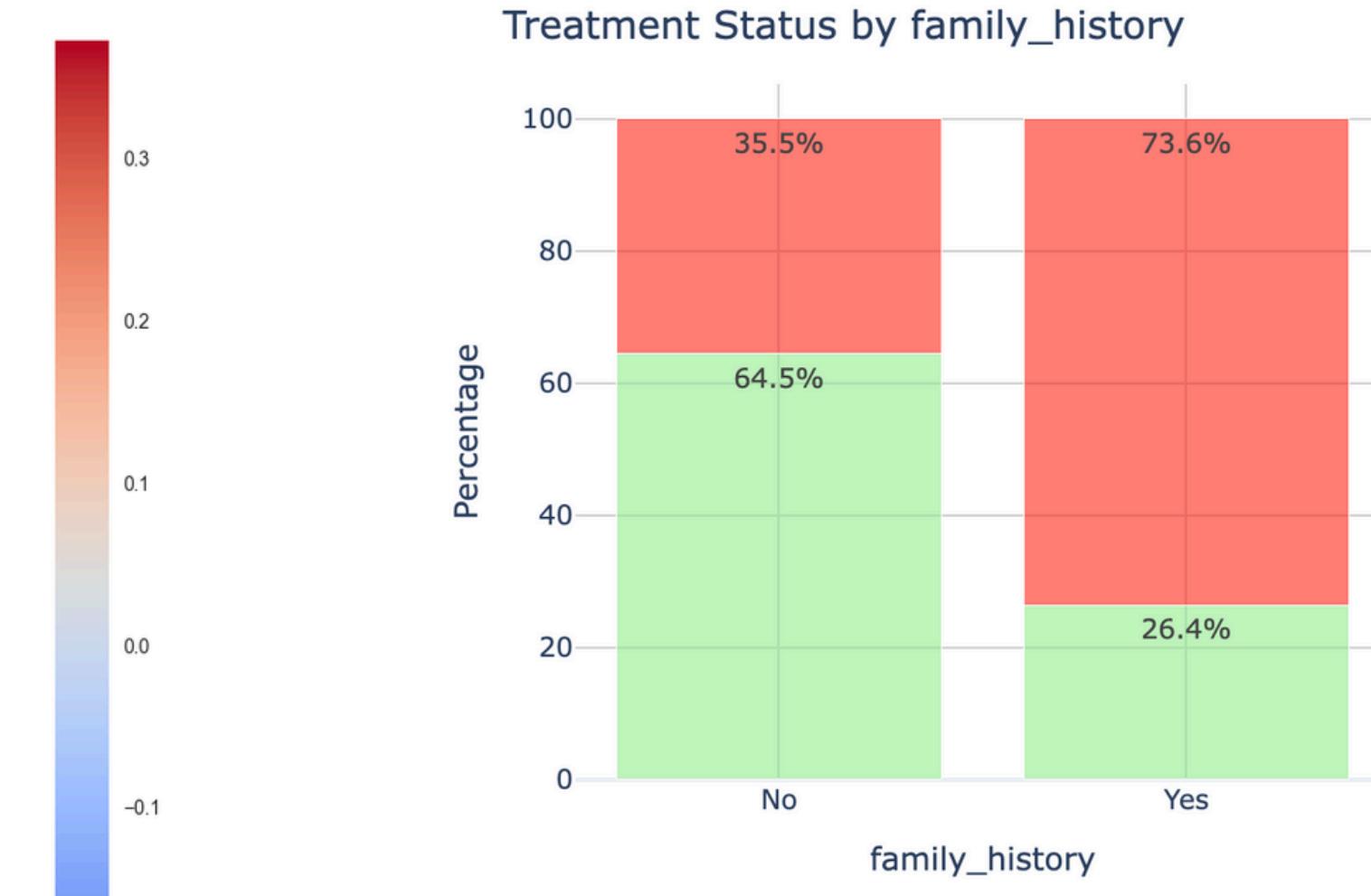
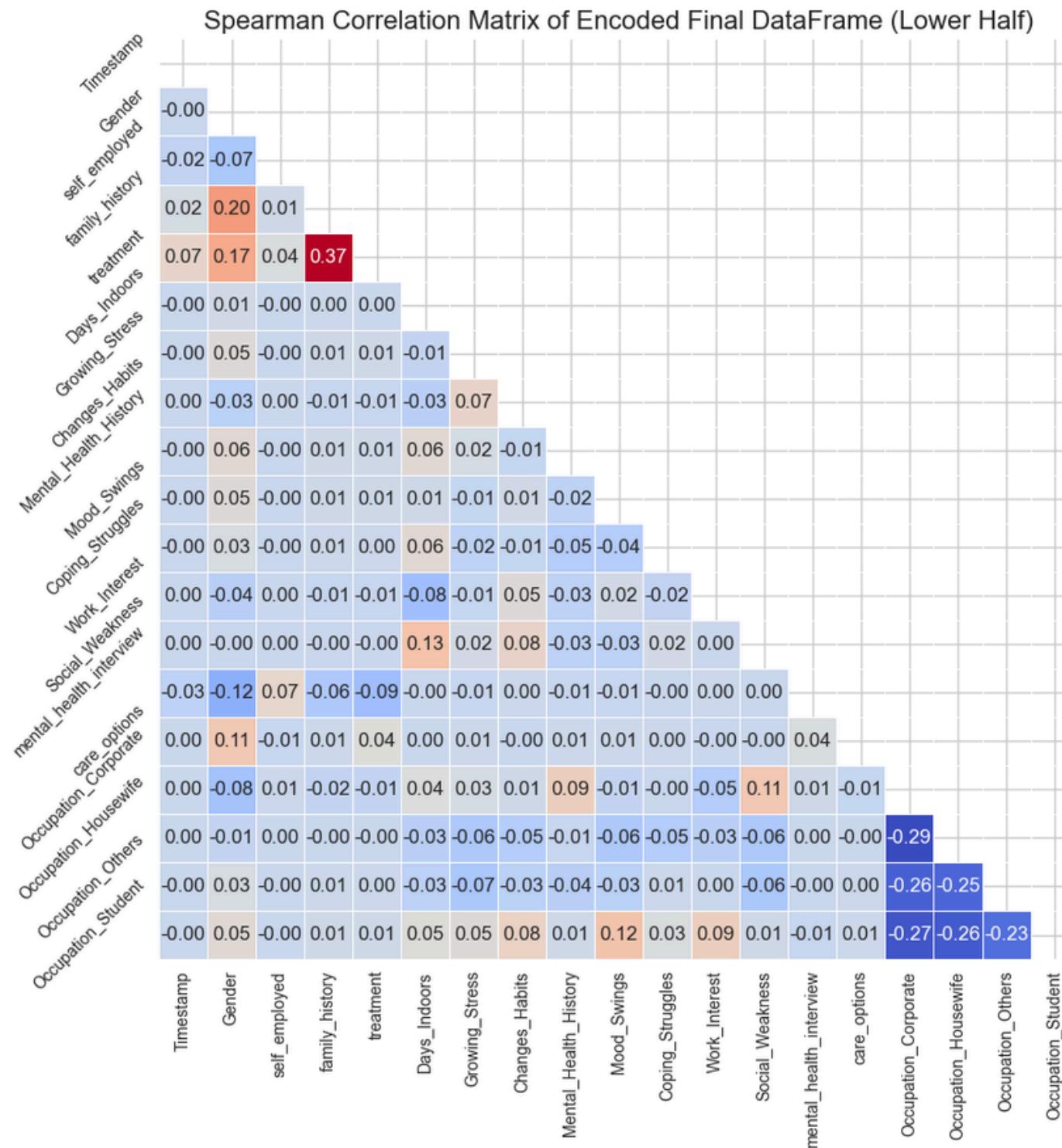
Q1. What are the top 5 factors that influence the growing stress?

C) Random Forest



Q2. Do people with family history receive treatment or not?

Background



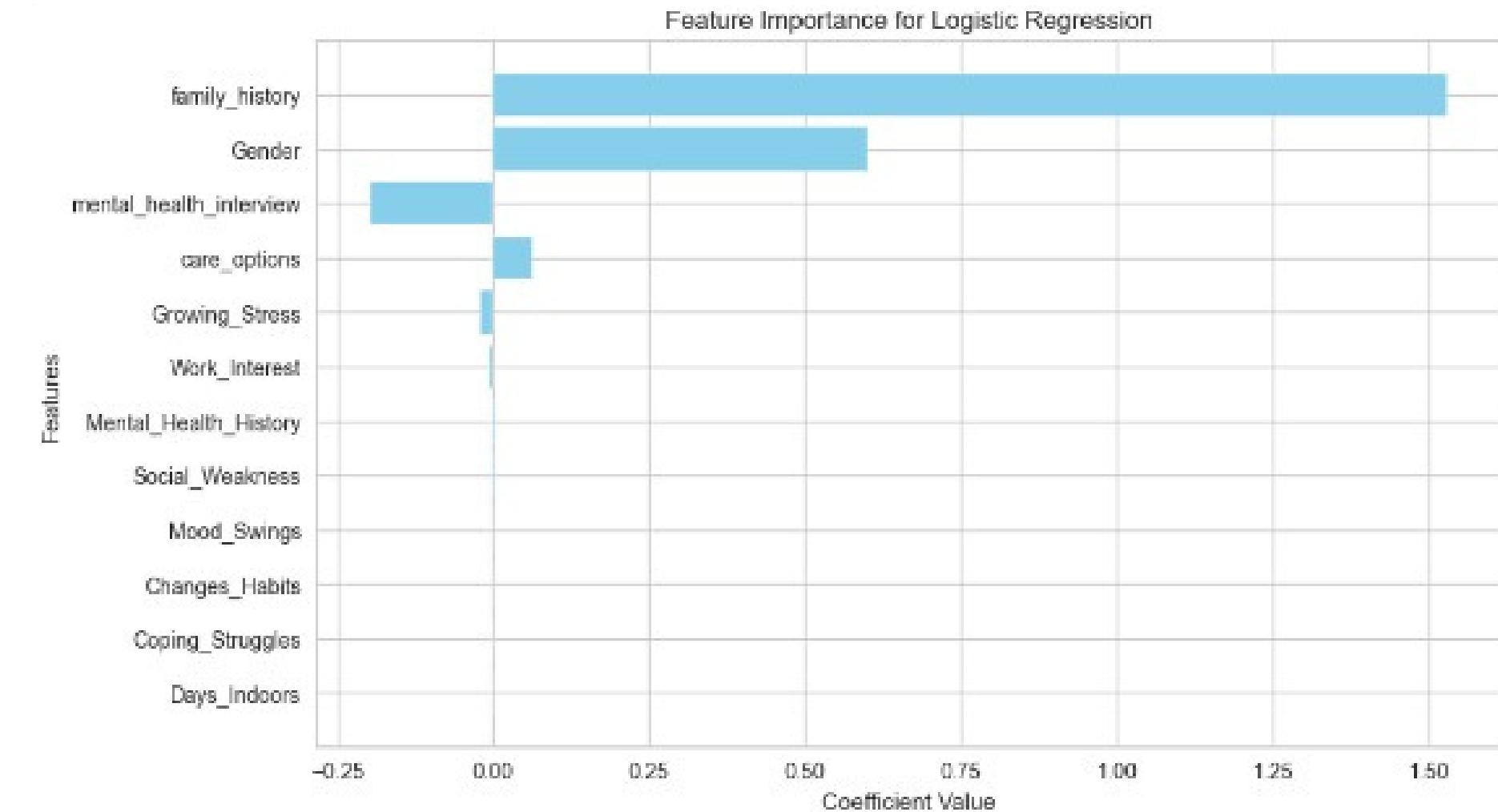
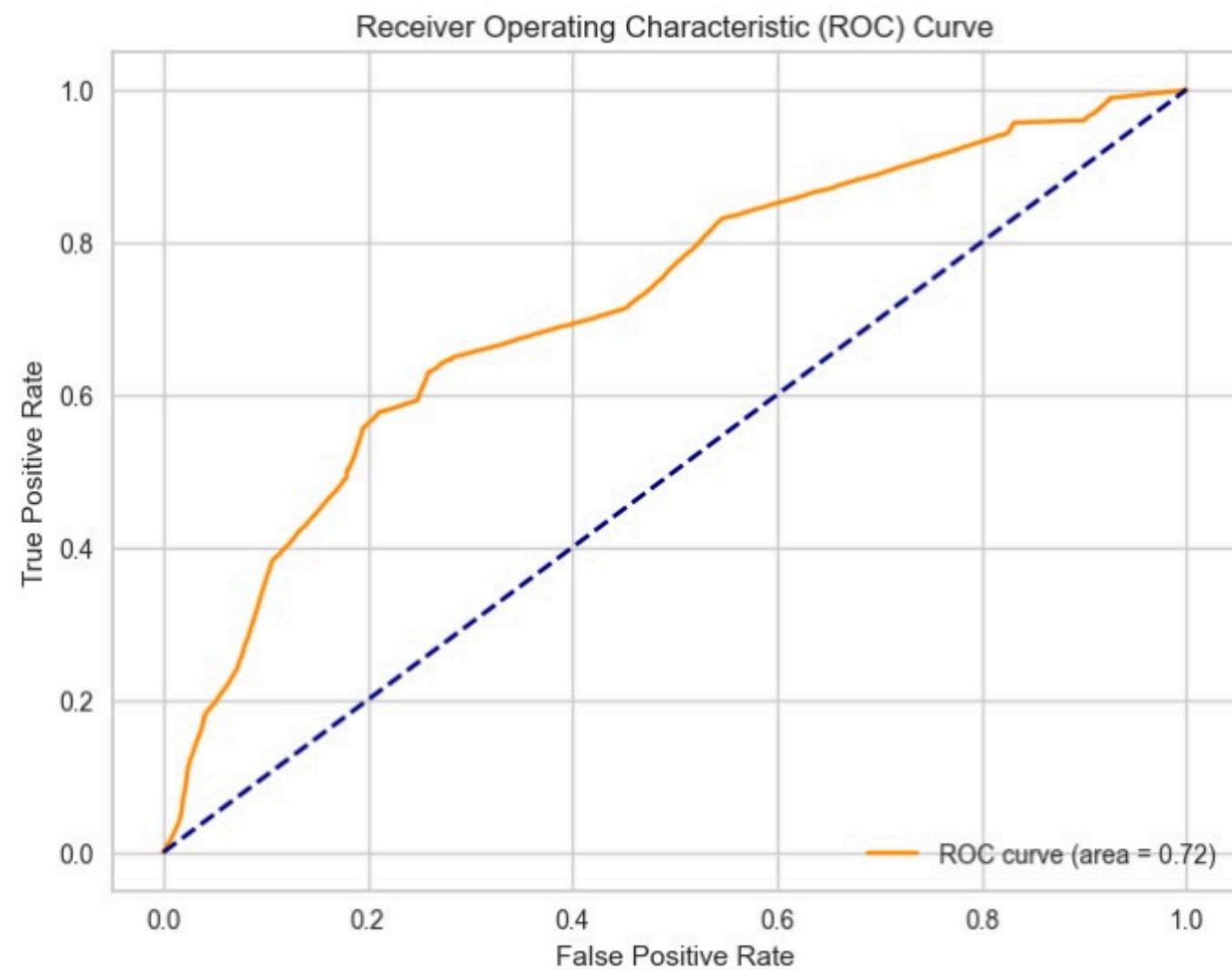
H_0 : {family_history} and Treatment are independent.
 H_1 : {family_history} and Treatment are not independent.

p-value = 0.00

Q2. Do people with family history receive treatment or not?

A) Logistic Regression

Number of Features Selected : 12



Accuracy: 68%

ROC: 0.72

family_history

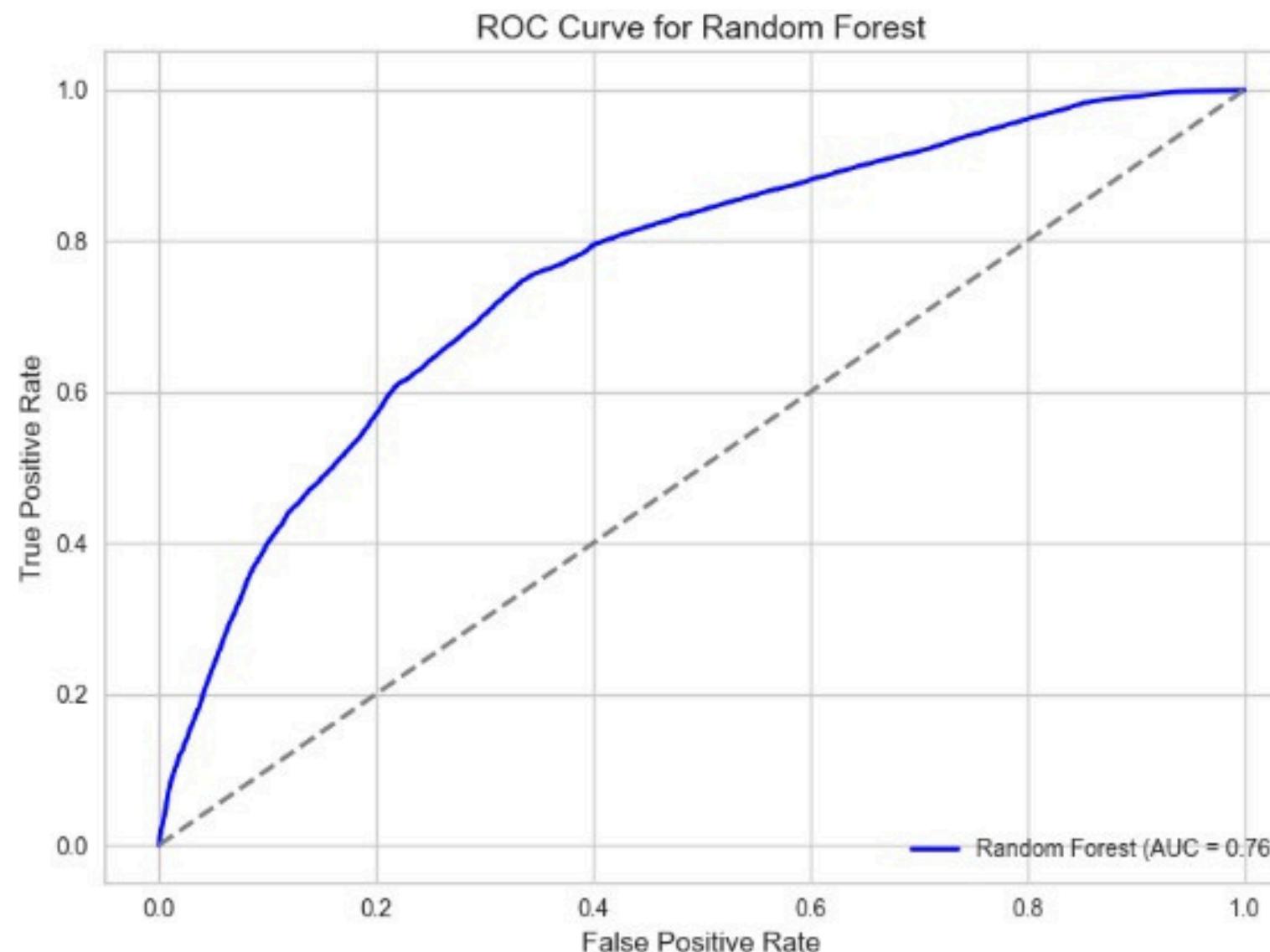
Gender

mental_health_interview

Q2. Do people with family history receive treatment or not?

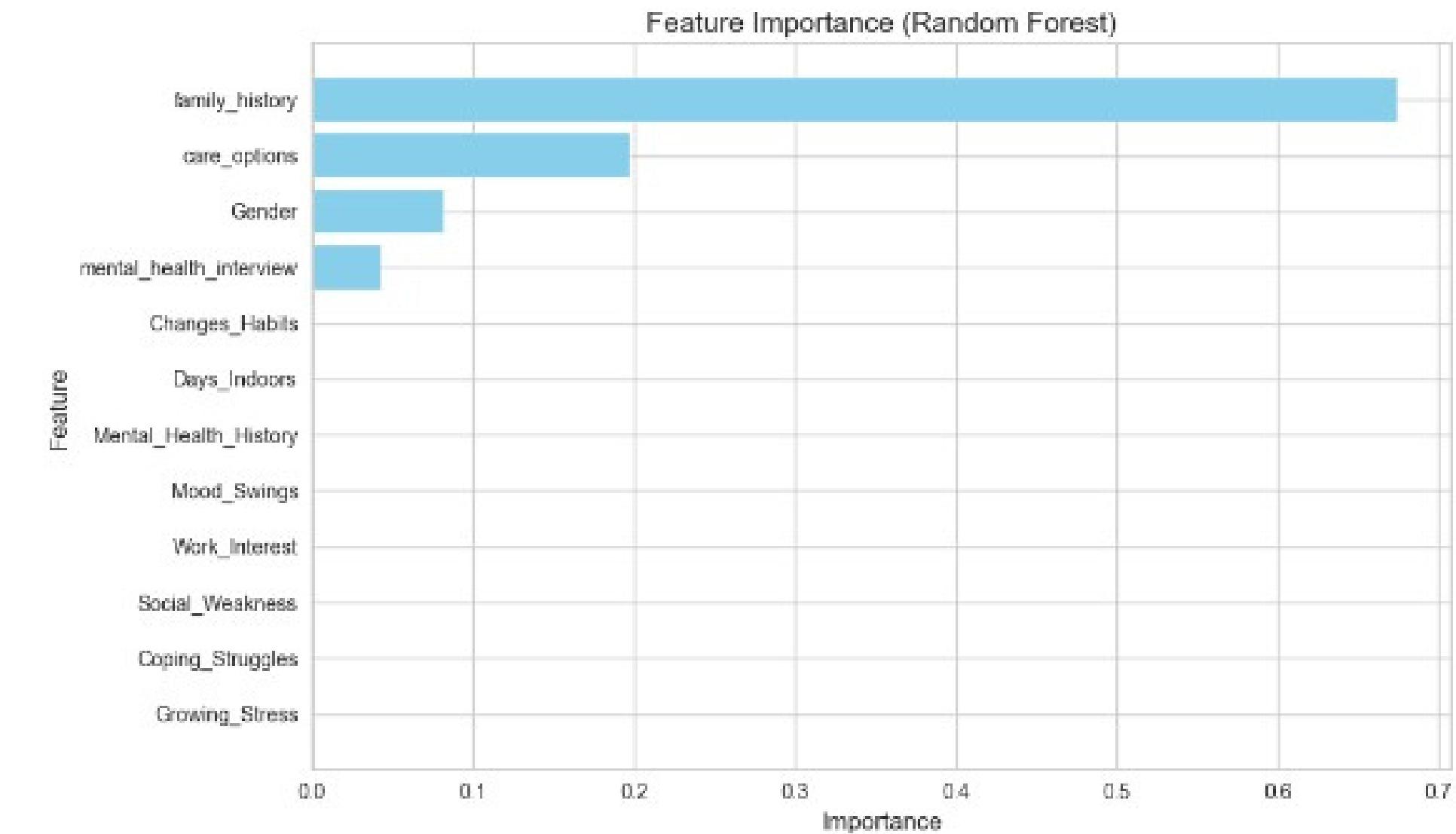
B) Random Forest

Number of Features Selected : 12



Accuracy: 70%

ROC: 0.76



family_history

care_options

Gender

Q3. What are the factors that impact the growing stress for students?

Steps

1. Preprocessing

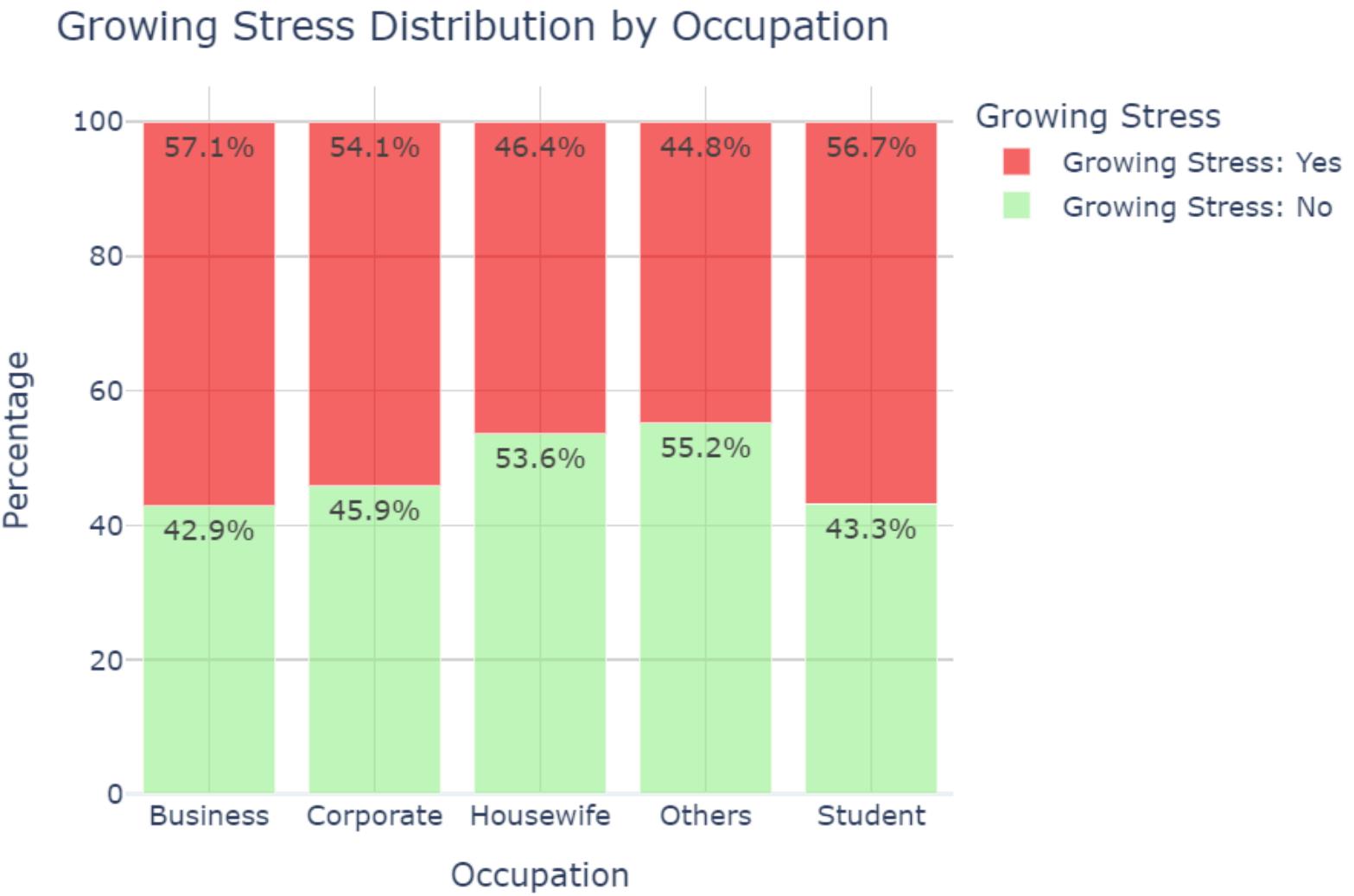
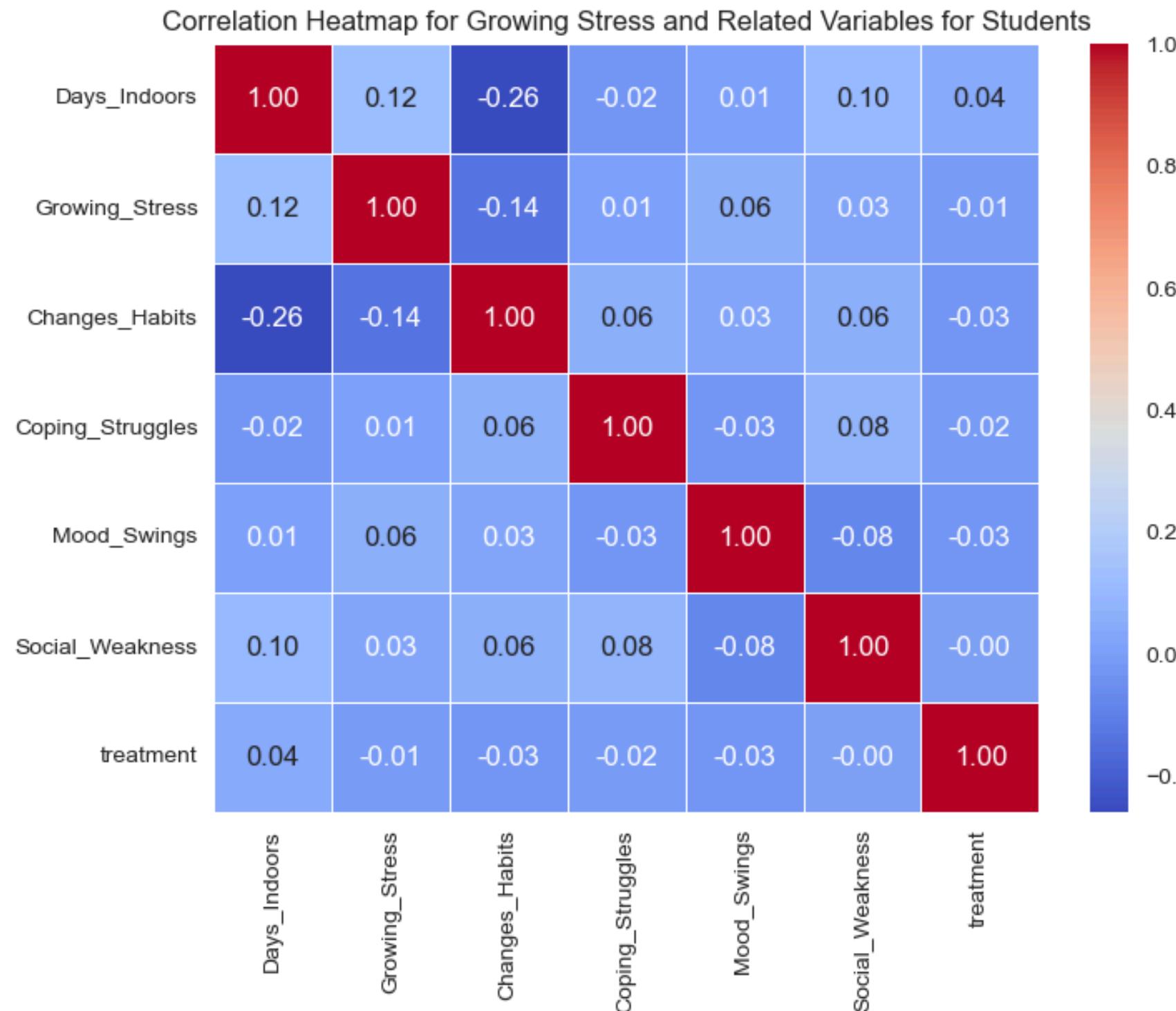
- a. Filter data for students
- b. Drop unwanted columns/predictors
- c. Drop “Maybe” value in our target variable

2. Models used

Logistic Regression

Q3. What are the factors that impact the growing stress for students?

Background



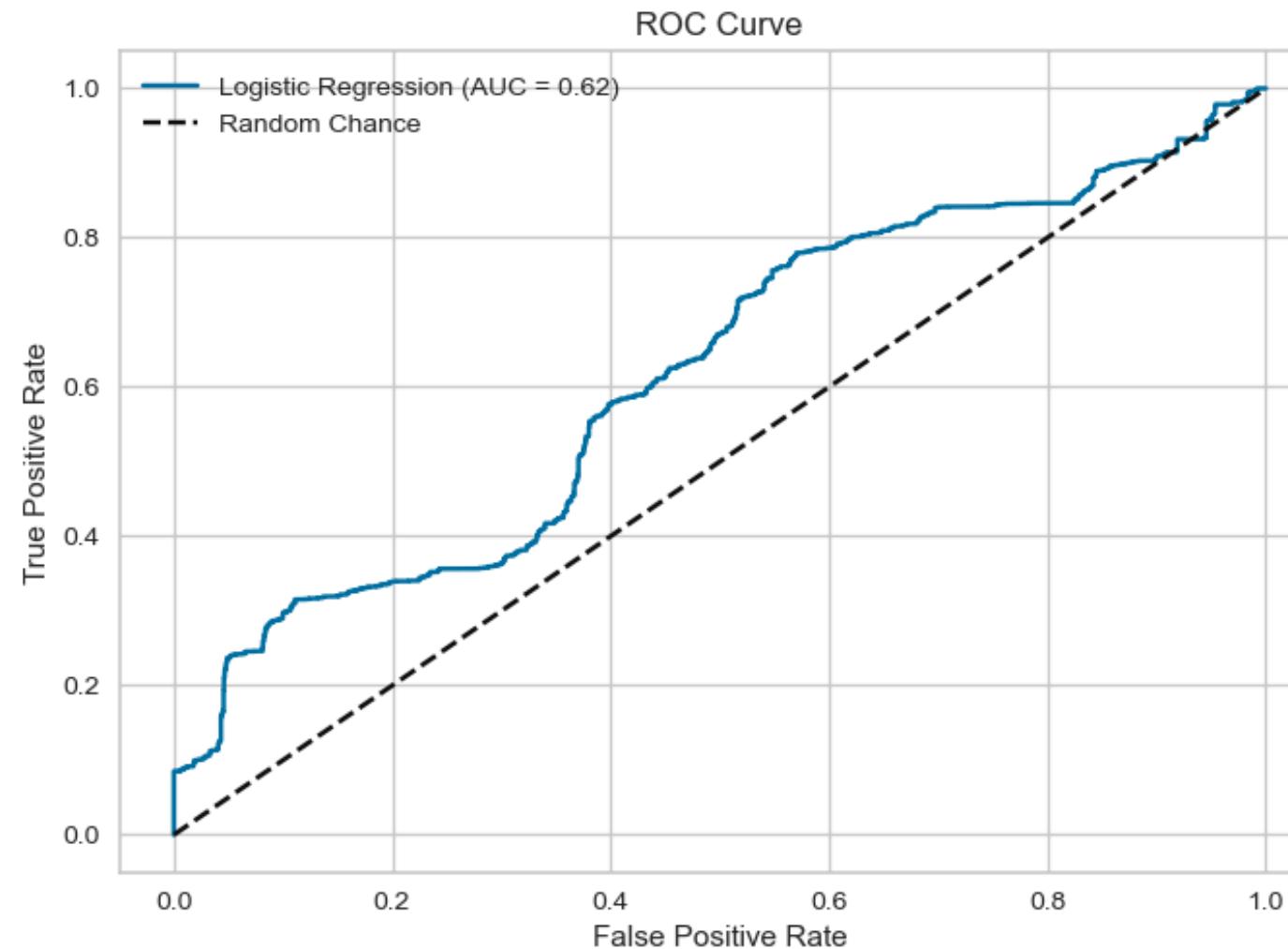
H_0 : {Occupation} and Growing Stress are independent.
 H_1 : {Occupation} and Growing Stress are not independent.

p-value = 0.00

Q3. What are the factors that impact the growing stress for students?

Logistic Regression

Number of Features Selected : 13

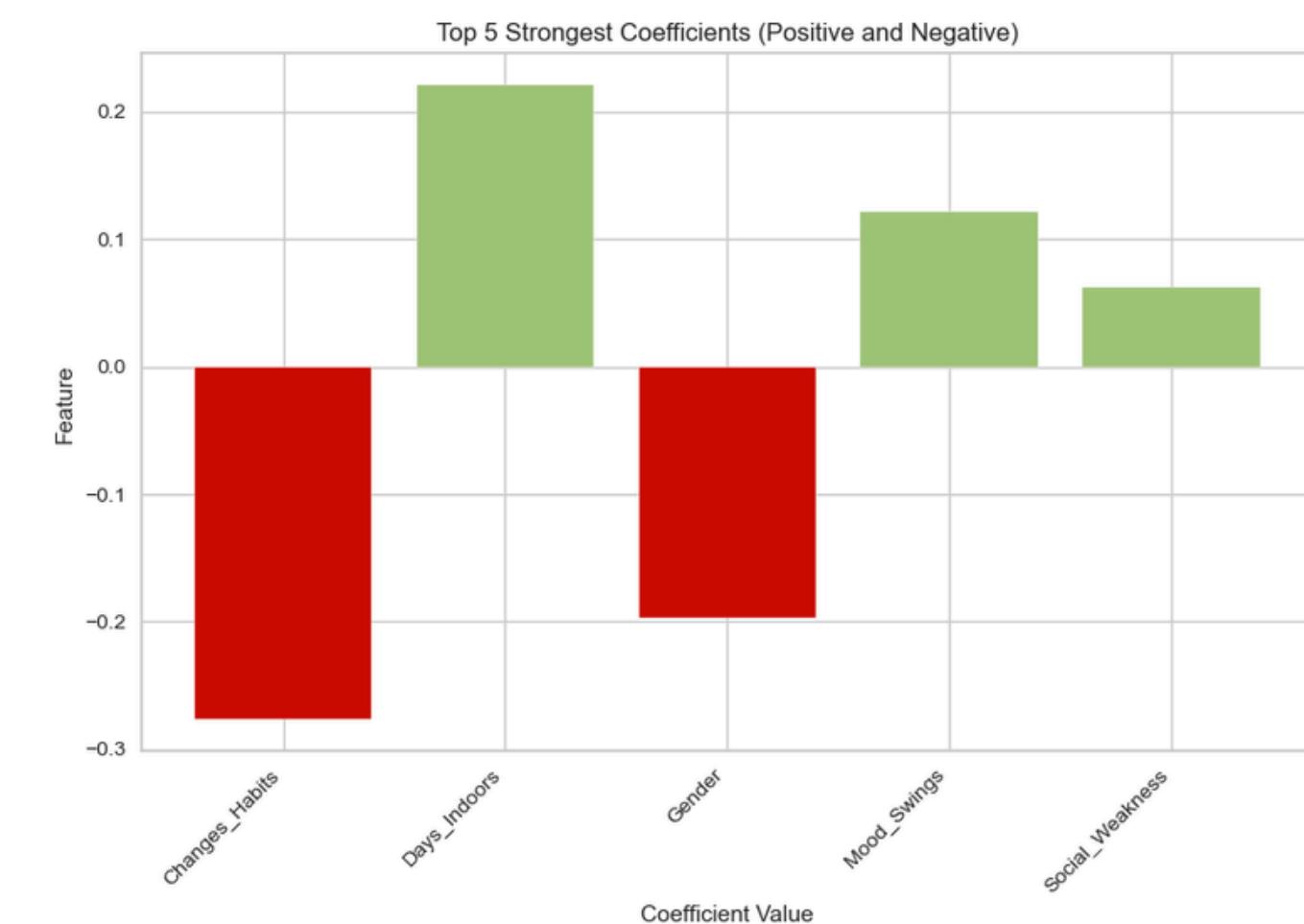


Accuracy: 61%

ROC: 0.62

Changes_Habits: -0.27
Days_Indoors: 0.22
Gender: -0.20
Mood_Swings: 0.12
Social_Weakness: 0.06

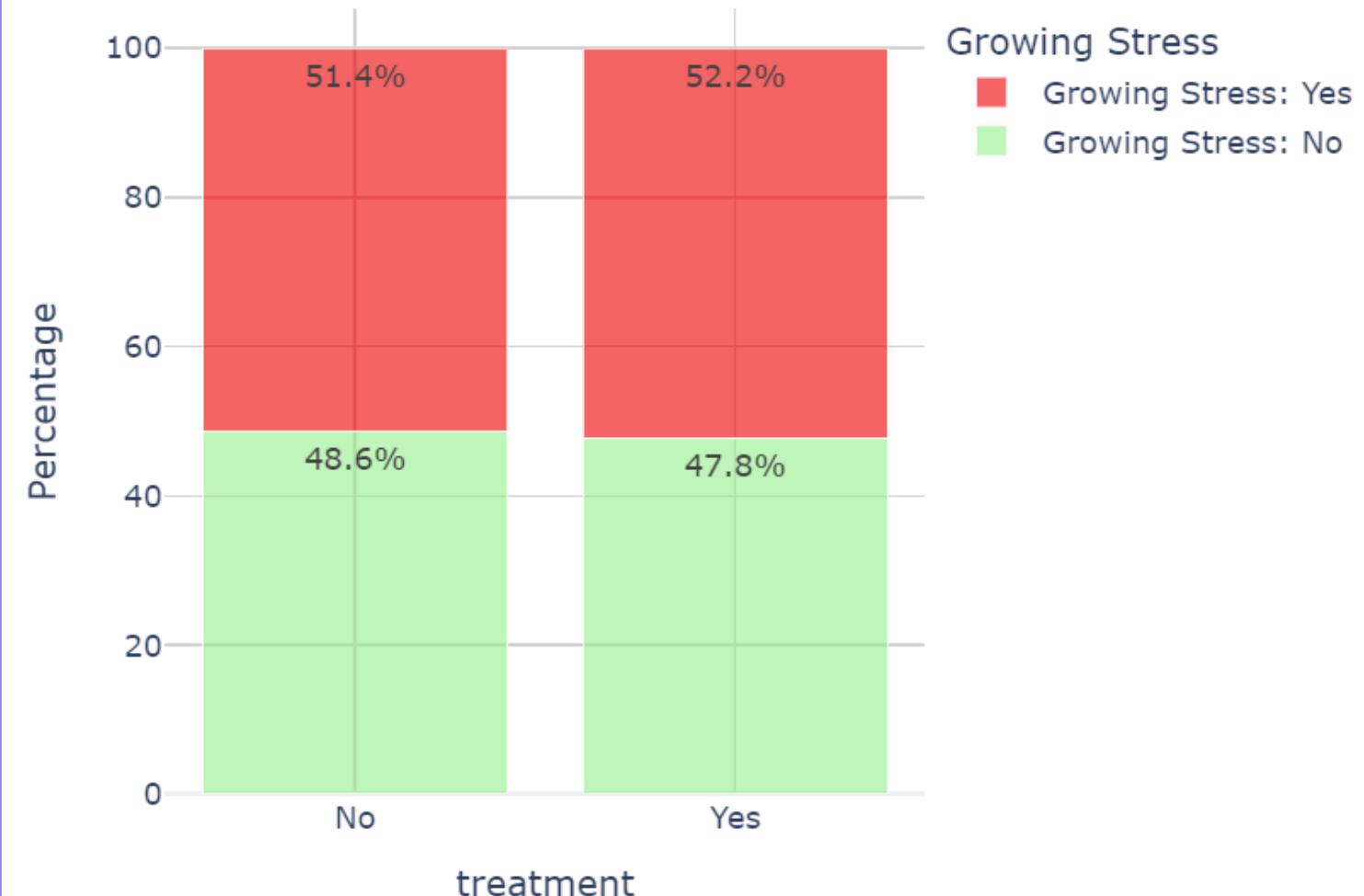
Actual	Predicted	
	0	1
0	1164	2063
1	839	3469



Conclusion

- The top 5 factors affecting growing stress across all occupations are **Mental Health History, Days Indoors, Work Interest, Mood Swings, and Changes in Habits.**
- For students, the top 5 factors are **Changes in Habits, Days Indoors, Gender, Mood Swings, and Social Weakness.**
- Individuals with a **family history of mental health issues** might be more likely to **acknowledge their symptoms or seek treatment.**
- Across all sectors, it is better to:
 - Spend more time outdoors.
 - Acknowledge stress if there are changes in habits or frequent mood swings.
 - Growing stress is negatively related to treatment, highlighting the importance of seeking treatment when experiencing such symptoms.

Growing Stress Distribution by treatment



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Division for Student Affairs

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Counseling & Psychological Services



Thank You

Appendix. Dataset Structure

Timestamp: ['8/27/2014 11:37' , '8/27/2014 11:43' , '8/27/2014 11:49' , ... , '2/1/2016 23:04']

Gender: ['Female', 'Male']

Country: ['United States' , 'Poland' , 'Australia' , 'Canada' , 'United Kingdom' , 'South Africa' , ... , 'Philippines']

Occupation: ['Corporate' , 'Student' , 'Business' , 'Housewife' , 'Others']

self_employed: ['No' , 'Yes']

family_history: ['Yes' , 'No']

treatment: ['Yes' , 'No']

Days_Indoors: ['1-14 days' , 'Go out Every day' , 'More than 2 months' , '15-30 days' , '31-60 days']

Growing_Stress: ['Yes' , 'No' , 'Maybe']

Changes_Habits: ['No' , 'Yes' , 'Maybe']

Mental_Health_History: ['Yes' , 'No' , 'Maybe']

Mood_Swings: ['Medium' , 'Low' , 'High']

Coping_Struggles: ['No' , 'Yes']

Work_Interest: ['No' , 'Maybe' , 'Yes']

Social_Weakness: ['Yes' , 'No' , 'Maybe']

mental_health_interview: ['Maybe' , 'No' , 'Yes']

care_options: ['Yes' , 'Not sure' , 'No']