```
#Loading the Libraries
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

```
#loading the data
data=pd.read_csv('survey (1).csv')
```

```
# types of data in dataset
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1259 entries, 0 to 1258
Data columns (total 27 columns):
 #   Column                     Non-Null Count  Dtype 
---  ------                     --------------  ----- 
 0   Timestamp                  1259 non-null   object
 1   Age                        1259 non-null   int64 
 2   Gender                     1259 non-null   object
 3   Country                    1259 non-null   object
 4   state                      744 non-null    object
 5   self_employed              1241 non-null   object
 6   family_history             1259 non-null   object
 7   treatment                  1259 non-null   object
 8   work_interfere             995 non-null    object
 9   no_employees               1259 non-null   object
 10  remote_work                1259 non-null   object
 11  tech_company               1259 non-null   object
 12  benefits                   1259 non-null   object
 13  care_options               1259 non-null   object
 14  wellness_program           1259 non-null   object
 15  seek_help                  1259 non-null   object
 16  anonymity                  1259 non-null   object
 17  leave                      1259 non-null   object
 18  mental_health_consequence  1259 non-null   object
 19  phys_health_consequence    1259 non-null   object
 20  coworkers                  1259 non-null   object
 21  supervisor                 1259 non-null   object
 22  mental_health_interview    1259 non-null   object
 23  phys_health_interview      1259 non-null   object
 24  mental_vs_physical         1259 non-null   object
 25  obs_consequence            1259 non-null   object
 26  comments                   164 non-null    object
dtypes: int64(1), object(26)
memory usage: 265.7+ KB
```

```
# for finding the rows and columns count in the dataset
data.shape
```

```
(1259, 27)
```

```
# for finding the details about data
data.describe()
```

| | Age | Gender | self_employed | family_history | treatment | no_employees | remote_work |
|---|---|---|---|---|---|---|---|
| **count** | 1259.000000 | 1259.000000 | 1259.000000 | 1259.000000 | 1259.000000 | 1259.000000 | 1259.000000 |
| **mean** | 20.013503 | 22.887212 | 0.144559 | 0.390786 | 0.505957 | 2.783161 | 0.298650 |
| **std** | 7.360940 | 9.745733 | 0.390355 | 0.488121 | 0.500163 | 1.740247 | 0.457848 |
| **min** | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| **25%** | 15.000000 | 20.000000 | 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.000000 |
| **50%** | 19.000000 | 20.000000 | 0.000000 | 0.000000 | 1.000000 | 3.000000 | 0.000000 |
| **75%** | 24.000000 | 33.000000 | 0.000000 | 1.000000 | 1.000000 | 4.000000 | 1.000000 |
| **max** | 52.000000 | 48.000000 | 2.000000 | 1.000000 | 1.000000 | 5.000000 | 1.000000 |

```
#for viewing all the columns in the dataset
data.columns
```

```
Index(['Timestamp', 'Age', 'Gender', 'Country', 'state', 'self_employed',
       'family_history', 'treatment', 'work_interfere', 'no_employees',
       'remote_work', 'tech_company', 'benefits', 'care_options',
       'wellness_program', 'seek_help', 'anonymity', 'leave',
       'mental_health_consequence', 'phys_health_consequence', 'coworkers',
       'supervisor', 'mental_health_interview', 'phys_health_interview',
       'mental_vs_physical', 'obs_consequence', 'comments'],
      dtype='object')
```

```
#For viewing first 5 records
data.head()
```

| | Timestamp | Age | Gender | Country | state | self_employed | family_history | treatment | work_interfere | no |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 2014-08-27 11:29:31 | 37 | Female | United States | IL | NaN | No | Yes | Often | |
| **1** | 2014-08-27 11:29:37 | 44 | M | United States | IN | NaN | No | No | Rarely | |
| **2** | 2014-08-27 11:29:44 | 32 | Male | Canada | NaN | NaN | No | No | Rarely | |
| **3** | 2014-08-27 11:29:46 | 31 | Male | United Kingdom | NaN | NaN | Yes | Yes | Often | |
| **4** | 2014-08-27 11:30:22 | 31 | Male | United States | TX | NaN | No | No | Never | |

5 rows × 27 columns

```
#For viewing last 5 records
data.tail()
```

| | Timestamp | Age | Gender | Country | state | self_employed | family_history | treatment | work_interfere |
|---|---|---|---|---|---|---|---|---|---|
| **1254** | 2015-09-12 11:17:21 | 26 | male | United Kingdom | NaN | No | No | Yes | NaN |
| **1255** | 2015-09-26 01:07:35 | 32 | Male | United States | IL | No | Yes | Yes | Often |
| **1256** | 2015-11-07 12:36:58 | 34 | male | United States | CA | No | Yes | Yes | Sometimes |
| **1257** | 2015-11-30 21:25:06 | 46 | f | United States | NC | No | No | No | NaN |
| **1258** | 2016-02-01 23:04:31 | 25 | Male | United States | IL | No | Yes | Yes | Sometimes |

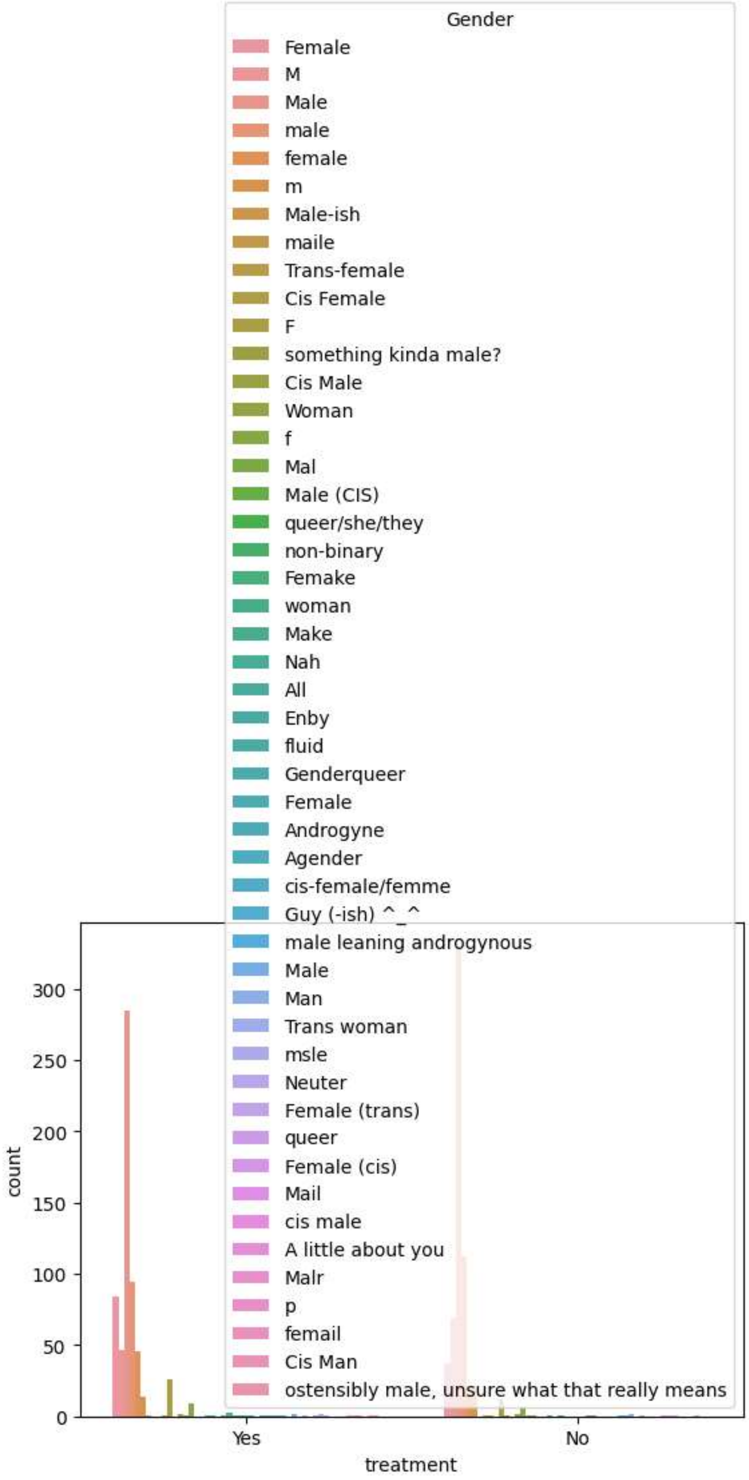
5 rows × 27 columns

```
#for view random samples of dataset
data.sample(4)
```

| | Timestamp | Age | Gender | Country | state | self_employed | family_history | treatment | work_interfere |
|---|---|---|---|---|---|---|---|---|---|
| **970** | 2014-08-29 07:12:43 | 43 | Male | United States | MI | No | No | No | Sometimes |
| **1103** | 2014-08-29 22:08:51 | 35 | Female | United States | WA | No | Yes | No | Sometimes |
| **412** | 2014-08-27 15:29:23 | 21 | male | United States | MA | No | Yes | No | Never |

```
# countplot of treatment and gender
sns.countplot(x='treatment',data=data,hue='Gender')
```

```
<Axes: xlabel='treatment', ylabel='count'>
```

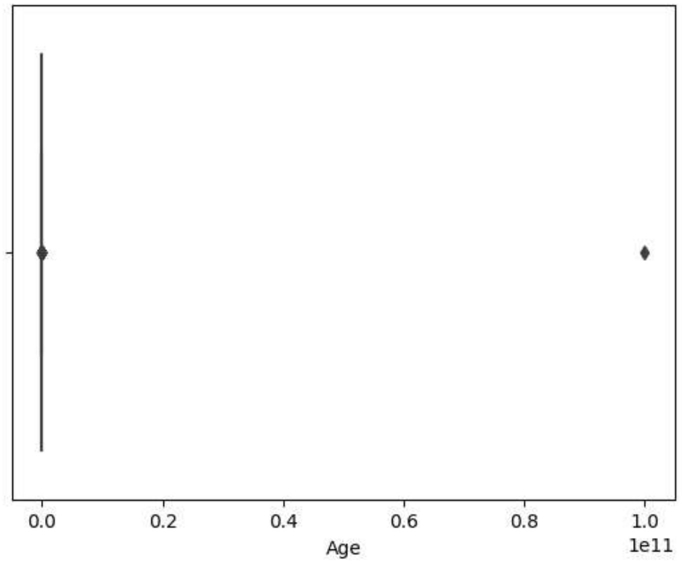


```
#checking null values in  a dataset if present
data.isnull().sum()
```

```
Timestamp                       0
Age                             0
Gender                          0
Country                         0
state                         515
self_employed                  18
family_history                  0
treatment                       0
work_interfere                264
no_employees                    0
remote_work                     0
tech_company                    0
benefits                        0
care_options                    0
wellness_program                0
seek_help                       0
anonymity                       0
leave                           0
mental_health_consequence       0
phys_health_consequence         0
coworkers                       0
supervisor                      0
mental_health_interview         0
phys_health_interview           0
mental_vs_physical              0
obs_consequence                 0
comments                     1095
dtype: int64
```

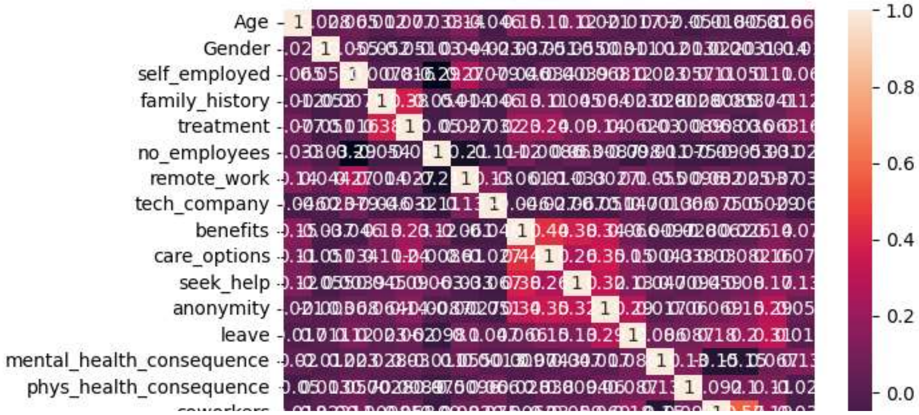
```
# boxplot of Age column:
sns.boxplot(x=data['Age'])
```

```
<Axes: xlabel='Age'>
```



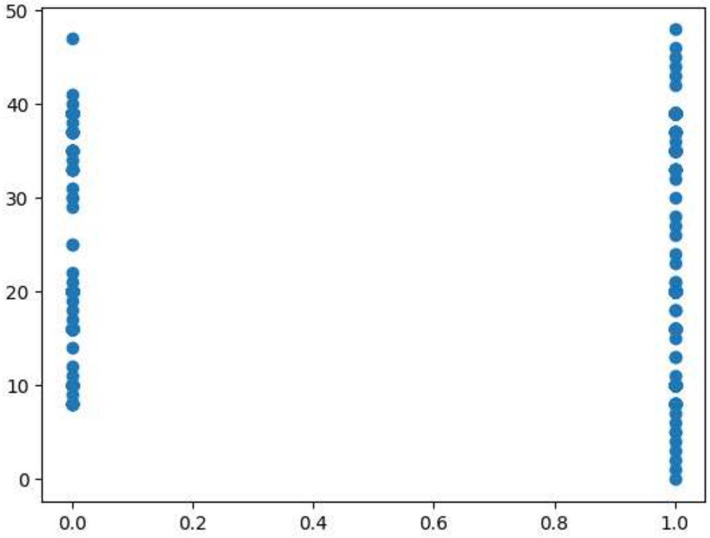
```
#Heatmap of dataset for finding the relationship.
sns.heatmap(data.corr(),annot=True)
```

```
<Axes: >
```



```
# plot scatter graph of treatment and gender
plt.scatter(data["treatment"],data["Gender"])
```

```
<matplotlib.collections.PathCollection at 0x7a1a78370520>
```



```
#displot of Age Column
sns.distplot(data['Age'])
```

```
<ipython-input-33-90de83b2aeb7>:2: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).
```

```
#Encoding (Converting All the Cateogrical Data into Numerical Data)
```

```
from sklearn.preprocessing import LabelEncoder
label_encoder=LabelEncoder()
```

```
# df.iloc[:, 1:]=label_encoder.fit_transform(df.iloc[:, 1:])
# Identify columns to label encode (excluding the first column)
columns_to_encode = data.iloc[:]
# Initialize the label encoder
label_encoder = LabelEncoder()
# Apply label encoding to each column in the DataFrame
for col in columns_to_encode:
 data[col] = label_encoder.fit_transform(data[col])
data.head()
```

| | Timestamp | Age | Gender | Country | state | self_employed | family_history | treatment | work_interfere | no_ |
|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0 | 25 | 10 | 45 | 10 | 2 | 0 | 1 | 1 | |
| **1** | 1 | 32 | 16 | 45 | 11 | 2 | 0 | 0 | 2 | |
| **2** | 2 | 20 | 20 | 7 | 45 | 2 | 0 | 0 | 2 | |
| **3** | 3 | 19 | 20 | 44 | 45 | 2 | 1 | 1 | 1 | |
| **4** | 4 | 19 | 20 | 45 | 37 | 2 | 0 | 0 | 0 | |

5 rows × 27 columns

```
# to check all columns should be of numerical data types.
data.dtypes
```

```
Timestamp                    int64
Age                          int64
Gender                       int64
Country                      int64
state                        int64
self_employed                int64
family_history               int64
treatment                    int64
work_interfere               int64
no_employees                 int64
remote_work                  int64
tech_company                 int64
benefits                     int64
care_options                 int64
wellness_program             int64
seek_help                    int64
anonymity                    int64
leave                        int64
mental_health_consequence    int64
phys_health_consequence      int64
coworkers                    int64
supervisor                   int64
mental_health_interview      int64
phys_health_interview        int64
mental_vs_physical           int64
obs_consequence              int64
comments                     int64
dtype: object
```

```
#Removing the necessary columns which are not necessary.
data=data.drop(['Timestamp','Country','state','work_interfere','comments','mental_health_interview','phys_health_interview','wellness_program
```

```
# checkimg any missing data for testing purpose :
data.isnull().sum()
```

```
    Age                          0
    Gender                       0
    self_employed                0
    family_history               0
    treatment                    0
    no_employees                 0
    remote_work                  0
    tech_company                 0
    benefits                     0
    care_options                 0
    seek_help                    0
    anonymity                    0
    leave                        0
    mental_health_consequence    0
    phys_health_consequence      0
    coworkers                    0
    supervisor                   0
    mental_vs_physical           0
    obs_consequence              0
    dtype: int64
```

```
# Training and Testing of dataset
```

```
from sklearn.model_selection import train_test_split
from sklearn import svm
from sklearn.metrics import accuracy_score
```

```
#Splitting the data.
```

```
x=data.drop('treatment',axis=1)
y=data['treatment']
```

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=1)
```

```
# MODELLING
```

```
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier

from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report
```

```
#checking Score by using Logistic Regression and Generate the classification Report:
```

```
model1=LogisticRegression()
model1.fit(x_train,y_train)
model1.score(x_train,y_train)
print("Score of train is :",model1.score(x_train,y_train))

model1.score(x_test,y_test)
print("Score of test is :",model1.score(x_test,y_test))

print(classification_report(y_test,model1.predict(x_test)))
```

```
    Score of train is : 0.730883813306852
    Score of test is : 0.6904761904761905
                  precision    recall  f1-score   support

               0       0.68      0.67      0.68       121
               1       0.70      0.71      0.70       131

        accuracy                           0.69       252
       macro avg       0.69      0.69      0.69       252
    weighted avg       0.69      0.69      0.69       252

    /usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_logistic.py:458: ConvergenceWarning: lbfgs failed to converge (status=1):
    STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

    Increase the number of iterations (max_iter) or scale the data as shown in:
        https://scikit-learn.org/stable/modules/preprocessing.html
    Please also refer to the documentation for alternative solver options:
      https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
    n_iter_i = _check_optimize_result(
```

```
# Checking the Training and Testing Score by DecisionTreeClassifier and classification Report
```

```
model2=DecisionTreeClassifier()
model2.fit(x_train,y_train)
model2.score(x_train,y_train)
print("Score of trained model is :",model2.score(x_train,y_train))
model2.score(x_test,y_test)
print("Score of tested model is :",model2.score(x_test,y_test))
print(classification_report(y_test,model2.predict(x_test)))
```

```
Score of trained model is : 1.0
Score of tested model is : 0.623015873015873
              precision    recall  f1-score   support

           0       0.61      0.58      0.60       121
           1       0.63      0.66      0.65       131

    accuracy                           0.62       252
   macro avg       0.62      0.62      0.62       252
weighted avg       0.62      0.62      0.62       252
```

```
# Checking the Training and Testing Score by RandomForestClassifier and classification Report
```

```
model3=RandomForestClassifier()
model3.fit(x_train,y_train)
model3.score(x_train,y_train)
print("Score of trained model is :",model3.score(x_train,y_train))

model3.score(x_test,y_test)
print("Score of tested model is :",model3.score(x_test,y_test))

print(classification_report(y_test,model3.predict(x_test)))
```

```
Score of trained model is : 1.0
Score of tested model is : 0.6706349206349206
              precision    recall  f1-score   support

           0       0.66      0.64      0.65       121
           1       0.68      0.69      0.69       131

    accuracy                           0.67       252
   macro avg       0.67      0.67      0.67       252
weighted avg       0.67      0.67      0.67       252
```

```
# Piclikng and Unpickling:
'''pickle:object to binary-dump() is used
unpickle: binary to object load() is used'''
```

```
import pickle
```

```
# syntax: dump(object,open(filename,mode))
# serialize process :
filename="file.pkl"
pickle.dump(data,open(filename,'wb'))
```

```
import pickle
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression

# Save the trained model to a pickle file
with open("model1.pkl", "wb") as f:
    pickle.dump(model1, f)
```

```
# PREDICTION FOR A GIVEN INPUT WHETHER THEY REQUIRED A TREATMENT OR NOT:
```

```
import pickle
```

```
# Load the trained model using pickle
with open("model1.pkl", "rb") as f:
     model1 = pickle.load(f)

# Function to take user input and make predictions
def predict_output(user_input):
    output = model1.predict(user_input)
    return output

# Example usage:
print("************************************* PLEASE FILL THE BELOW DETAILS FOR OUTPUT PREDICTION **************************************")
Age=int(input("Enter Age"))
print("Enter 0 for Female\nEnter 1 for Male\nEnter 2 for others ")
Gender=int(input("Enter Gender"))
print("Enter 0 for No\nEnter 1 for Yes")
self_employed=int(input("Enter self_employed"))
print("Enter 0 for No\nEnter 1 for Yes")
family_history=int(input("Enter family_history"))
print("Enter 4 for no. of employee between 6-25\nEnter 5 for no. of employee more than 1000\nEnter 2 for no. of employee between 26-100\nEnte
no_employees=int(input("Enter no_employees"))
print("Enter 0 for no and 1 for yes")
remote_work=int(input("remote_work"))
print("Enter 0 for no and 1 for yes")
tech_company=int(input("Enter tech_company"))
print("enter 0 for Don't know\n Enter 1 for No\Enter 2 for yes")
benefits=int(input("enter benefits"))
print("enter 0 for no\n Enter 1 for Not sure\Enter 2 for yes")
care_options=int(input("enter care_options"))
print("enter 0 for Don't know\n Enter 1 for No\Enter 2 for yes")
seek_help=int(input("enter seek_help"))
print("enter 0 for Don't know\n Enter 1 for No\Enter 2 for yes")
anonymity=int(input("anonymity"))
print("Enter 0 for Don't know\nEnter 1 for Somewhat difficult\nEnter 2 for Somewhat easy\enter 3 for Very difficult\nEnter 4 for very easy")
leave=int(input("leave"))
print("enter 0 for may be\n Enter 1 for No\Enter 2 for yes")
mental_health_consequence=int(input("mental_health_consequence"))
print("enter 0 for may be\n Enter 1 for No\Enter 2 for yes")
phys_health_consequence=int(input("phys_health_consequence"))
print("enter 0 for no\n Enter 1 for some of them\Enter 2 for yes")
coworkers=int(input("Enter no of coworkers"))
print("enter 0 for no\n Enter 1 for some of them\Enter 2 for yes")
supervisor=int(input("Enter supervisor"))
print("enter 0 for Don't know\n Enter 1 for No\Enter 2 for yes")
mental_vs_physical=int(input("Enter mental_vs_physical"))
print("Enter 0 for No\nEnter 1 for Yes")
obs_consequence=int(input("Enter obs_consequence"))


user_input_data = [[Age,Gender,self_employed,family_history,no_employees,remote_work,tech_company,benefits,care_options,seek_help,anonymity,l
result = predict_output(user_input_data)
if result[0] == 0:
    print("There is no treatment reaquired")
else:
    print("Yes The treatment required")
```

```
Enter Gender1
Enter 0 for No
Enter 1 for Yes
Enter self_employed1
Enter 0 for No
Enter 1 for Yes
Enter family_history1
Enter 4 for no. of employee between 6-25
Enter 5 for no. of employee more than 1000
Enter 2 for no. of employee between 26-100
Enter 1 for no. of employee between 100-500
Enter 0 for no. of employee between 1-5
Enter 3 for no. of employee between 500-1000

Enter no_employees0
Enter 0 for no and 1 for yes
```

```
enter benefits1
enter 0 for no
 Enter 1 for Not sure\Enter 2 for yes
enter care_options1
enter 0 for Don't know
 Enter 1 for No\Enter 2 for yes
enter seek_help2
enter 0 for Don't know
 Enter 1 for No\Enter 2 for yes
anonymity1
Enter 0 for Don't know
Enter 1 for Somewhat difficult
Enter 2 for Somewhat easy\enter 3 for Very difficult
Enter 4 for very easy
leave4
enter 0 for may be
 Enter 1 for No\Enter 2 for yes
mental_health_consequence1
enter 0 for may be
 Enter 1 for No\Enter 2 for yes
phys_health_consequence2
enter 0 for no
 Enter 1 for some of them\Enter 2 for yes
Enter no of coworkers1
enter 0 for no
 Enter 1 for some of them\Enter 2 for yes
Enter supervisor1
enter 0 for Don't know
 Enter 1 for No\Enter 2 for yes
Enter mental_vs_physical1
Enter 0 for No
Enter 1 for Yes
Enter obs_consequence0
Yes The treatment required
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarning: X does not have valid feature names, but LogisticRegression
  warnings.warn(
```

✓ 1s completed at 7:33 AM