

***Faculty of Science and Technology***

**Assignment Coversheet**

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<b>Unit name</b>	<b>Software technology</b>
<b>Unit number</b>	<b>4483</b>
<b>Unit Tutor</b>	<b>Linda</b>
<b>Assignment name</b>	<b>ST1 Capstone Project – Semester 1 2023</b>
<b>Due date</b>	<b>12/05/2023</b>
<b>Date submitted</b>	<b>12/05/2023</b>

**You must keep a photocopy or electronic copy of your assignment.**

## **Student declaration**

**I certify that the attached assignment is my own work. Material drawn from other sources has been appropriately and fully acknowledged as to author/creator, source and other bibliographic details**

**Signature of student: MM**

**Date: 12/05/23**

## Introduction

This report looks into Lung cancer and the potential risk of an individual being more prone than others depending on many different factors. To achieve this, the report will discuss lung cancer and provide charts and explanations. To make this all possible I have used a data set from kaggle which will provide different variables and parameters for me to use in my report. I will be making a GUI using python to make and running an EDA and a PDA on the data set. This will increase the understanding of this topic for individuals and prove the accuracy of the data set.

Lung cancer is the leading cause of cancer death and the fifth most common cancer diagnosis in Australia(Cancer Council), The average age of diagnosis being 71 (Cancer Council) . There are many factors which can show an individual if they are prone to cancer or not. These could help prevent the potential diagnosis and make individuals more aware of their day to day activities and habits. With the survival rate of cancer being very low with “around 40 out of every 100 people (around 40%) survive their cancer for 1 year or more around 15 out of every 100 people (around 15%) will survive their cancer for 5 years or more 10 out of every 100 people (10%) will survive their cancer for 10 years or more” according to cancer research UK (cancer research UK). This is a problem that is quite concerning with rates this low, this would also take a toll on peoples financial stability as chemotherapy is pricy and expensive for most, this often leads to people starting things such as a GOFundMe page to be able to pay for their fees.

By making a GUI that is useful. This would act as a prevention method and raise awareness for lung cancer. Making people more aware would decrease their chances of getting cancer by avoiding the leading causes and habits. This will allow for a prediction for the person's likelihood of being diagnosed. Tkinter will be used to complete this GUI. On top of this an Exploratory data analysis and a Predictive data analysis will be done to ensure maximum accuracy.

## Methodology

### **Design and development:**

Running the EDA and PDA will be crucial for this stage to ensure maximum accuracy, once the best Artificial intelligence is identified, the rest of the stages will be easier. This will aid in solving the problem at hand.

### **Implementation:**

After the best performing AI is identified it is then implemented into the GUI using Tkinter as the main tool to design the GUI, aiding in providing further accuracy

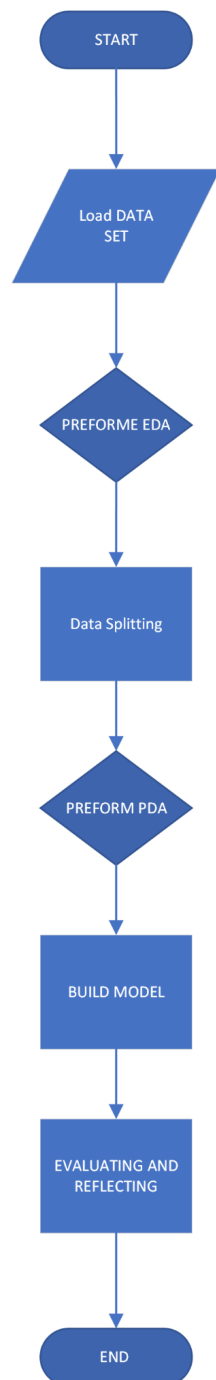
### **Deployment:**

Deployment will also be done using Tkinter and the tool will be usable for users.

## Design and development

Load DataSet  
Preform EDA  
SPLIT data  
Preform PDA  
BUILD MODEL  
EVALUATE AND REFLECT

**FLOWCHART:**



## Dataset Description:

The data set related to risk of an individual's possibility to be diagnosed with cancer, only one data set is used for this project, which was found on kaggle. The dataset consists of 999 rows and 26 different columns. The columns included : Patient ID, Age, Gender, air pollution, alcohol, dust allergy, occupational risks, genetic risk, chronic lung disease, blanched diet, obesity, smoking, passive smoker, chest pain, coughing, fatigue, weight loss, shortness of breath, wheezing, swallowing difficulty, clubbing on fingernails, frequent cold, Dry cough, snoring and level. This data set will help with achieving the task of making a GUI which can predict if someone is more or less prone to cancer.

## EDA:

The EDA was done through google collab as it was the only platform I was familiar with, and the program language used was python as it is what we were asked to use.

### Questions:

What is the most contributing factor to Lung Cancer?

What is the distribution between high, medium and low risk?

What is the most common age?

What is the least contributing symptom for lung cancer?

What is the correlation between smoking and lung cancer?

```
from google.colab import drive
drive.mount("/content/drive")
# Import libraries
import os
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import missingno as msno
import plotly.graph_objects as go
import plotly.express as px
%matplotlib inline
import warnings
warnings.filterwarnings('ignore')
# Read dataset
df = pd.read_csv("/content/drive/MyDrive/Uni/ST1/Copy of cancer patient
data sets.csv")
#1. Checking description(first 5 rows)
df.head()#1. Checking description(last 5 rows)
```

```

df.tail()
#rows and columns-data shape(attributes & samples)
df.shape
#3. Visualising data distribution in detail
fig = plt.figure(figsize =(18,18))
ax=fig.gca()
df.hist(ax=ax,bins =30)
plt.show()

```

	index	Patient Id	Age	Gender	Air Pollution	Alcohol use	Dust Allergy	OccuPational Hazards	Genetic Risk	chronic Lung Disease	...	Fatigue	Weight Loss	Shortness of Breath	Wheezing	Swallowing Difficulty
0	0	P1	33	1	2	4	5	4	3	2	...	3	4	2	2	3
1	1	P10	17	1	3	1	5	3	4	2	...	1	3	7	8	6
2	2	P100	35	1	4	5	6	5	5	4	...	8	7	9	2	1
3	3	P1000	37	1	7	7	7	7	6	7	...	4	2	3	1	4
4	4	P101	46	1	6	8	7	7	7	6	...	3	2	4	1	4

5 rows × 26 columns

Swallowing Difficulty	Clubbing of Finger Nails	Frequent Cold	Dry Cough	Snoring	Level
3	1	2	3	4	0
6	2	1	7	2	1
1	4	6	7	2	2
4	5	6	7	5	2
4	2	4	2	3	2



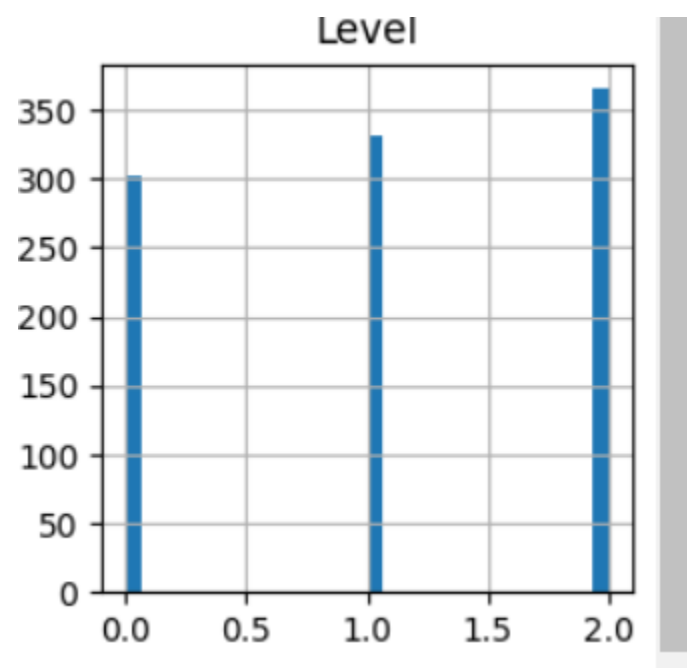
index	Patient Id	Age	Gender	Air Pollution	Alcohol use	Dust Allergy	Occupational Hazards	Genetic Risk	chronic Lung Disease	...	Fatigue	Weight Loss	Shortness of Breath	Wheezing	Swallowing Difficulty
995	995	P995	44	1	6	7	7	7	6	...	5	3	2	7	8
996	996	P996	37	2	6	8	7	7	6	...	9	6	5	7	2
997	997	P997	25	2	4	5	6	5	4	...	8	7	9	2	1
998	998	P998	18	2	6	8	7	7	6	...	3	2	4	1	4
999	999	P999	47	1	6	5	6	5	4	...	8	7	9	2	1

5 rows × 26 columns

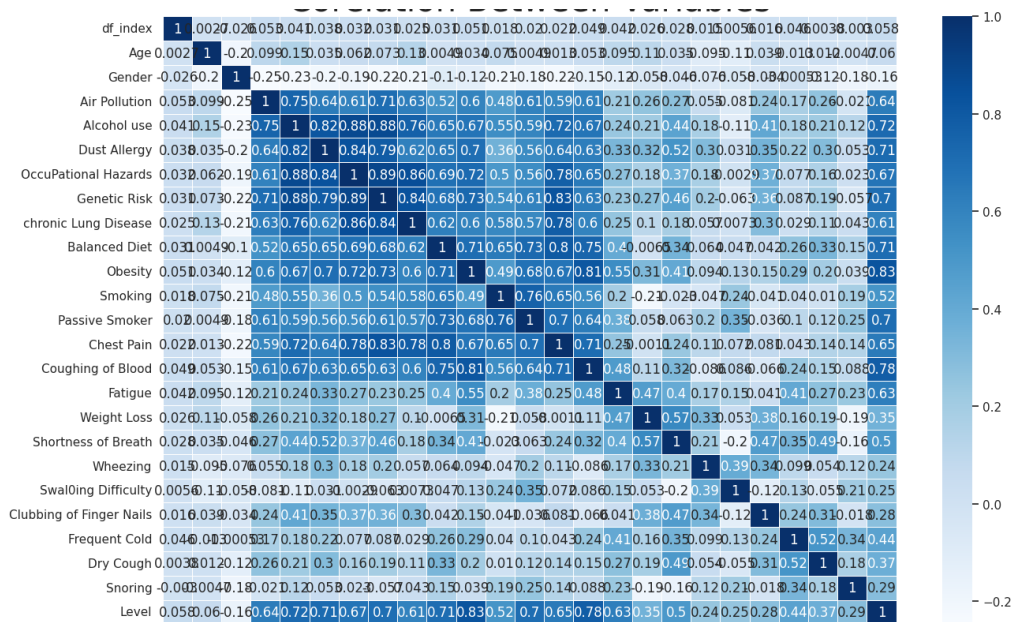


Swallowing Difficulty	Clubbing of Finger Nails	Frequent Cold	Dry Cough	Snoring	Level
8	2	4	5	3	2
2	4	3	1	4	2
1	4	6	7	2	2
4	2	4	2	3	2
1	4	6	7	2	2

(1000, 26)







## PDA:

For performing the PDA, the data needed to be pre processed. This was the first step however after that came confusion matrix, classifier comparison (To get the best machine learning classifier and highest accuracy possible). This was done using python scikit-learn.

```
# Pre-processing / Model prediction Development
from sklearn.exceptions import DataDimensionalityWarning
#encode object columns to integers
from sklearn import preprocessing
from sklearn.preprocessing import OrdinalEncoder

for col in df:
    if df[col].dtype == 'object':
        df[col]=OrdinalEncoder().fit_transform(df[col].values.reshape(-1,1))
df
class_label =df['Level']
df = df.drop(['Level'], axis=1)
df = (df-df.min())/(df.max()-df.min())
df['Level']=class_label
df
#pre-processing
le = preprocessing.LabelEncoder()
Age = le.fit_transform(list(df["Age"]))
Gender = le.fit_transform(list(df["Gender"]))
AirPollution = le.fit_transform(list(df["Air Pollution"]))
```

```

Alcohol_use = le.fit_transform(list(df["Alcohol use"]))
DustAllergy = le.fit_transform(list(df["Dust Allergy"]))
OccuPationalHazards = le.fit_transform(list(df["OccuPational Hazards"]))
GeneticRisk = le.fit_transform(list(df["Genetic Risk"]))
ChronicLungDisease = le.fit_transform(list(df["chronic Lung Disease"]))
BalancedDiet = le.fit_transform(list(df["Balanced Diet"]))
Obesity = le.fit_transform(list(df["Obesity"]))
Smoking = le.fit_transform(list(df["Smoking"]))
PassiveSmoker = le.fit_transform(list(df["Passive Smoker"]))
ChestPain = le.fit_transform(list(df["Chest Pain"]))
CoughingBlood = le.fit_transform(list(df["Coughing of Blood"]))
Fatigue = le.fit_transform(list(df["Fatigue"]))
WeightLoss = le.fit_transform(list(df["Weight Loss"]))
ShortnessBreath = le.fit_transform(list(df["Shortness of Breath"]))
Wheezing = le.fit_transform(list(df["Wheezing"]))
SwallowingDifficulty = le.fit_transform(list(df["Swal0ing Difficulty"]))
ClubbingFingerNails = le.fit_transform(list(df["Clubbing of Finger
Nails"]))
FrequentCold = le.fit_transform(list(df["Frequent Cold"]))
DryCough = le.fit_transform(list(df["Dry Cough"]))
Snoring = le.fit_transform(list(df["Snoring"]))
Level = le.fit_transform(list(df["Level"])) # 0 low, 1 = medium, 2 = high
risk
x = list(zip(Age, Gender, AirPollution, Alcohol_use, DustAllergy,
OccuPationalHazards, GeneticRisk, ChronicLungDisease, BalancedDiet,
Obesity, Smoking, PassiveSmoker, ChestPain, CoughingBlood, Fatigue,
WeightLoss, ShortnessBreath, Wheezing, SwallowingDifficulty,
ClubbingFingerNails, FrequentCold, DryCough, Snoring))
y = list(Level)
# Test options and evaluation metric
num_folds = 5
seed = 7
scoring = 'accuracy'
# Model Test/Train
# Splitting what we are trying to predict into 4 different arrays -
# X train is a section of the x array(attributes) and vise versa for
Y(features)
# The test data will test the accuracy of the model created
import sklearn.model_selection

```

```

x_train, x_test, y_train, y_test =
sklearn.model_selection.train_test_split(x, y, test_size = 0.30,
random_state=seed)
#splitting 20% of our data into test samples. If we train the model with
higher data it already has seen that information and knows
#size of train and test subsets after splitting
import numpy as np
np.shape(x_train), np.shape(x_test)
# Predictive analytics model development by comparing different
Scikit-learn classification algorithms
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split
from sklearn.model_selection import KFold
from sklearn.model_selection import cross_val_score
from sklearn.model_selection import GridSearchCV
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix, ConfusionMatrixDisplay
from sklearn.metrics import accuracy_score
from sklearn.pipeline import Pipeline
from sklearn.linear_model import LogisticRegression
from sklearn.tree import DecisionTreeClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.discriminant_analysis import LinearDiscriminantAnalysis
from sklearn.naive_bayes import GaussianNB
from sklearn.svm import SVC
from sklearn.ensemble import AdaBoostClassifier
from sklearn.ensemble import GradientBoostingClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.ensemble import ExtraTreesClassifier

models = []
models.append(('NB', GaussianNB()))
models.append(('SVM', SVC()))
models.append(('GBM', GradientBoostingClassifier()))
models.append(('RF', RandomForestClassifier()))
# evaluate each model in turn
results = []
names = []
print("Performance on Training set")
for name, model in models:

```

```

kfold = KFold(n_splits=num_folds,shuffle=True,random_state=seed)
cv_results = cross_val_score(model, x_train, y_train, cv=kfold,
scoring='accuracy')
results.append(cv_results)
names.append(name)
msg = "%s: %f (%f)" % (name, cv_results.mean(), cv_results.std())
msg += '\n'
print(msg)
# Compare Algorithm Performance
import matplotlib.pyplot as plt
fig = plt.figure()
fig.suptitle('Algorithm Comparison')
ax = fig.add_subplot(111)
plt.boxplot(results)
ax.set_xticklabels(names)
plt.show()
# Model Evaluation by testing with independent/external test data set.

models.append(('DT', DecisionTreeClassifier()))
models.append(('NB', GaussianNB()))
models.append(('SVM', SVC()))
models.append(('GBM', GradientBoostingClassifier()))
models.append(('RF', RandomForestClassifier()))
dt = DecisionTreeClassifier()
nb = GaussianNB()
gb = GradientBoostingClassifier()
rf = RandomForestClassifier()

best_model = rf
best_model.fit(x_train, y_train)
y_pred = best_model.predict(x_test)
print("Best Model Accuracy Score on Test Set:", accuracy_score(y_test,
y_pred))
# Classification Report
print(classification_report(y_test, y_pred))
# Confusion matrix
from sklearn.metrics import confusion_matrix, ConfusionMatrixDisplay
cm = confusion_matrix(y_test, y_pred)
disp = ConfusionMatrixDisplay(confusion_matrix=cm)
disp.plot()

```

```
plt.show()
# Prediction report
for x in range(len(y_pred)):
    print("Predicted: ", y_pred[x], "Actual: ", y_test[x], "Data: ",
x_test[x],)
```

	df_index	Patient Id	Age	Gender	Air Pollution	Alcohol use	Dust Allergy	OccuPational Hazards	Genetic Risk	chronic Lung Disease	...	Fatigue	Weight Loss
0	0	0.0	33	1	2	4	5	4	3	2	...	3	4
1	1	1.0	17	1	3	1	5	3	4	2	...	1	3
2	2	2.0	35	1	4	5	6	5	5	4	...	8	7
3	3	3.0	37	1	7	7	7	7	6	7	...	4	2
4	4	4.0	46	1	6	8	7	7	7	6	...	3	2
...	...	...	...	...	...	...	...	...	...	...	...	...	...
995	995	995.0	44	1	6	7	7	7	7	6	...	5	3
996	996	996.0	37	2	6	8	7	7	7	6	...	9	6
997	997	997.0	25	2	4	5	6	5	5	4	...	8	7
998	998	998.0	18	2	6	8	7	7	7	6	...	3	2
999	999	999.0	47	1	6	5	6	5	5	4	...	8	7

1000 rows × 26 columns

Shortness of Breath	Wheezing	Swaløing Difficulty	Clubbing of Finger Nails	Frequent Cold	Dry Cough	Snoring	Level
2	2	3	1	2	3	4	0
7	8	6	2	1	7	2	1
9	2	1	4	6	7	2	2
3	1	4	5	6	7	5	2
4	1	4	2	4	2	3	2
...	...	...	...	...	...	...	...
2	7	8	2	4	5	3	2
5	7	2	4	3	1	4	2
9	2	1	4	6	7	2	2
4	1	4	2	4	2	3	2
9	2	1	4	6	7	2	2

	df_index	Patient Id	Age	Gender	Air Pollution	Alcohol use	Dust Allergy	Occupational Hazards	Genetic Risk	chronic Lung Disease	...	Fatigue	Weight Loss	Shortness of Breath	Wheezing	Swallowing Difficulty	Clubbing of Finger Nails	Frequent Cold	Dry Cough	Snoring	Level
0	0.000000	0.000000	0.322034	0.0	0.142857	0.428571	0.571429	0.428571	0.333333	0.166667	...	0.250	0.428571	0.125	0.142857	0.285714	0.000	0.166667	0.333333	0.500000	0
1	0.001001	0.001001	0.050847	0.0	0.285714	0.000000	0.571429	0.285714	0.500000	0.166667	...	0.000	0.285714	0.750	1.000000	0.714286	0.125	0.000000	1.000000	0.166667	1
2	0.002002	0.002002	0.355932	0.0	0.428571	0.571429	0.714286	0.571429	0.666667	0.500000	...	0.875	0.857143	1.000	0.142857	0.000000	0.375	0.833333	1.000000	0.166667	2
3	0.003003	0.003003	0.389831	0.0	0.857143	0.857143	0.857143	0.857143	0.833333	1.000000	...	0.375	0.142857	0.250	0.000000	0.428571	0.500	0.833333	1.000000	0.666667	2
4	0.004004	0.004004	0.542373	0.0	0.714286	1.000000	0.857143	0.857143	1.000000	0.833333	...	0.250	0.142857	0.375	0.000000	0.428571	0.125	0.500000	0.166667	0.333333	2
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
995	0.995996	0.995996	0.508475	0.0	0.714286	0.857143	0.857143	0.857143	1.000000	0.833333	...	0.500	0.285714	0.125	0.857143	1.000000	0.125	0.500000	0.666667	0.333333	2
996	0.996997	0.996997	0.389831	1.0	0.714286	1.000000	0.857143	0.857143	1.000000	0.833333	...	1.000	0.714286	0.500	0.857143	0.142857	0.375	0.333333	0.000000	0.500000	2
997	0.997998	0.997998	0.186441	1.0	0.428571	0.571429	0.714286	0.571429	0.666667	0.500000	...	0.875	0.857143	1.000	0.142857	0.000000	0.375	0.833333	1.000000	0.166667	2
998	0.998999	0.998999	0.067797	1.0	0.714286	1.000000	0.857143	0.857143	1.000000	0.833333	...	0.250	0.142857	0.375	0.000000	0.428571	0.125	0.500000	0.166667	0.333333	2
999	1.000000	1.000000	0.559322	0.0	0.714286	0.571429	0.714286	0.571429	0.666667	0.500000	...	0.875	0.857143	1.000	0.142857	0.000000	0.375	0.833333	1.000000	0.166667	2

1000 rows x 26 columns

((700, 23), (300, 23))

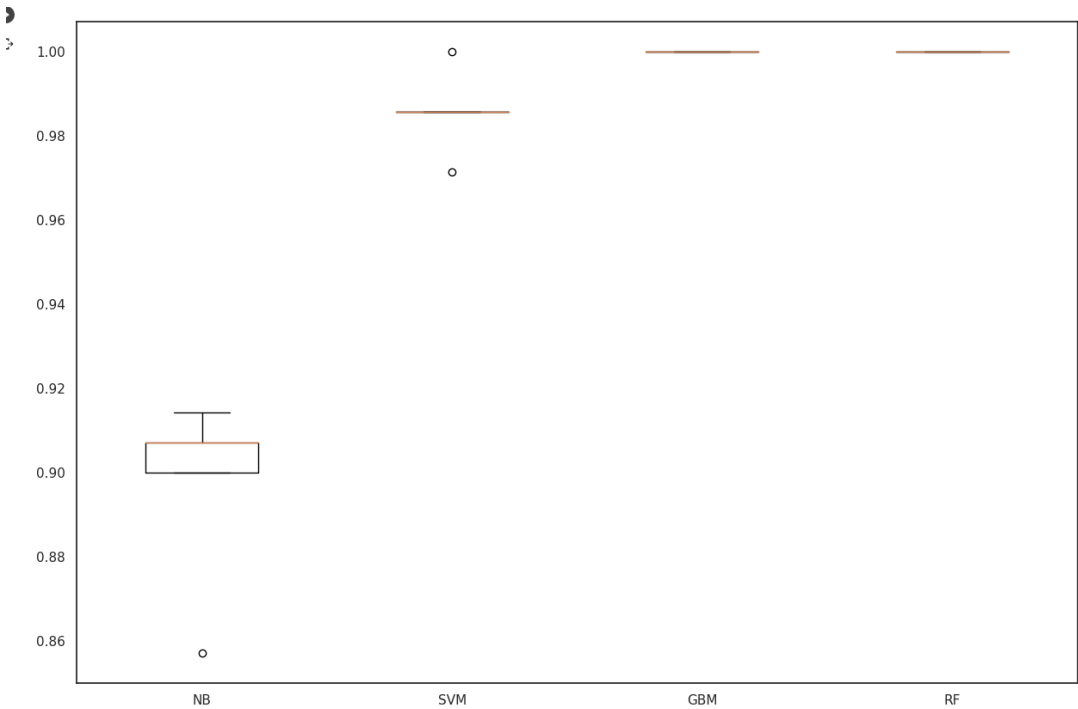
Performance on Training set

NB: 0.897143 (0.020504)

SVM: 0.985714 (0.009035)

GBM: 1.000000 (0.000000)

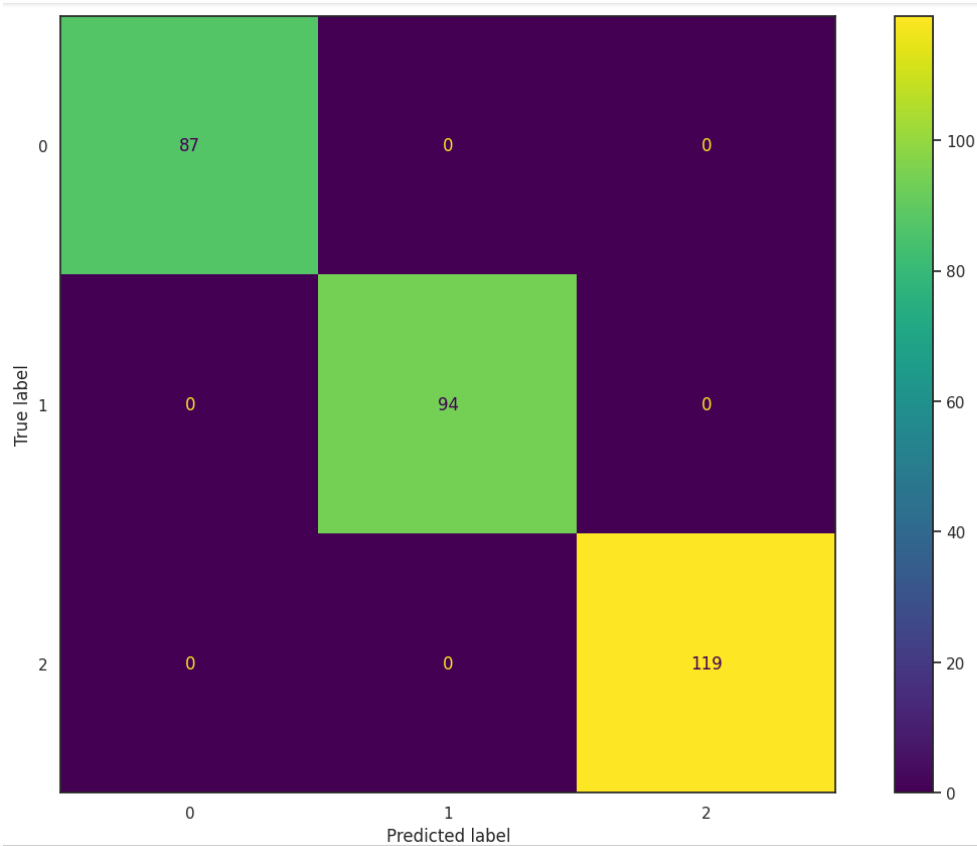
RF: 1.000000 (0.000000)



Best Model Accuracy Score on Test Set: 1.0

	precision	recall	f1-score	support
0	1.00	1.00	1.00	87

1	1.00	1.00	1.00	94
2	1.00	1.00	1.00	119
accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300



Predicted: 0 Actual: 0 Data: (9, 1, 2, 0, 3, 1, 2, 1, 2, 2, 1, 1, 3, 1, 1, 1, 2, 3, 0, 4, 1, 5, 1)

Predicted: 1 Actual: 1 Data: (9, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 0, 4)

Predicted: 0 Actual: 0 Data: (19, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 0, 0, 0, 1, 2, 1, 4, 0, 4, 0, 0)

Predicted: 1 Actual: 1 Data: (38, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)

Predicted: 2 Actual: 2 Data: (18, 1, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)

Predicted: 1 Actual: 1 Data: (16, 0, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)

Predicted: 2 Actual: 2 Data: (18, 0, 5, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 4, 6, 5, 6, 7, 6, 5, 1)

Predicted: 2 Actual: 2 Data: (9, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)

Predicted: 0 Actual: 0 Data: (1, 1, 0, 1, 2, 3, 3, 2, 1, 0, 2, 1, 0, 1, 0, 2, 2, 1, 0, 2, 1, 0, 0)

Predicted: 0 Actual: 0 Data: (19, 0, 1, 2, 4, 1, 0, 0, 0, 0, 3, 2, 1, 3, 1, 0, 2, 3, 5, 0, 2, 1, 1)

Predicted: 2 Actual: 2 Data: (17, 0, 5, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 6, 4, 6, 5, 6, 7, 6, 5, 1)

Predicted: 2 Actual: 2 Data: (6, 0, 5, 7, 6, 6, 5, 6, 6, 2, 7, 6, 8, 5, 4, 1, 4, 1, 2, 1, 0, 6, 5)

Predicted: 2 Actual: 2 Data: (3, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)

Predicted: 0 Actual: 0 Data: (27, 0, 3, 1, 2, 1, 0, 1, 2, 1, 0, 4, 0, 3, 1, 5, 0, 1, 3, 1, 0, 1, 2)

Predicted: 2 Actual: 2 Data: (7, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)

Predicted: 2 Actual: 2 Data: (25, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)

Predicted: 0 Actual: 0 Data: (9, 1, 2, 0, 3, 1, 2, 1, 2, 2, 1, 1, 3, 1, 1, 1, 2, 3, 0, 4, 1, 5, 1)

Predicted: 1 Actual: 1 Data: (9, 1, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 0, 4)

Predicted: 2 Actual: 2 Data: (8, 0, 5, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)

Predicted: 1 Actual: 1 Data: (38, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)

Predicted: 1 Actual: 1 Data: (13, 1, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7, 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)

Predicted: 2 Actual: 2 Data: (2, 1, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)

Predicted: 2 Actual: 2 Data: (15, 0, 5, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)

Predicted: 1 Actual: 1 Data: (35, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)

Predicted: 2 Actual: 2 Data: (3, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)

Predicted: 1 Actual: 1 Data: (4, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)

Predicted: 1 Actual: 1 Data: (38, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)

Predicted: 0 Actual: 0 Data: (9, 0, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0, 2, 1, 1, 3, 1, 1, 2, 3, 2)

Predicted: 0 Actual: 0 Data: (24, 1, 0, 1, 3, 4, 5, 4, 4, 3, 5, 3, 6, 1, 2, 7, 6, 2, 7, 2, 1, 2, 0)

Predicted: 1 Actual: 1 Data: (39, 0, 4, 5, 5, 4, 5, 4, 5, 4, 7, 4, 4, 4, 3, 2, 5, 1, 0, 1, 0, 5, 1)



Predicted: 1 Actual: 1 Data: (39, 0, 4, 5, 5, 4, 5, 4, 5, 4, 7, 4, 4, 4, 3, 2, 5, 1, 0, 1, 0, 5, 1)  
 Predicted: 2 Actual: 2 Data: (15, 0, 5, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)  
 Predicted: 2 Actual: 2 Data: (28, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 0 Actual: 0 Data: (26, 1, 1, 2, 0, 2, 1, 4, 1, 0, 1, 0, 1, 4, 2, 1, 0, 1, 2, 0, 2, 3, 1)  
 Predicted: 2 Actual: 2 Data: (9, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 1 Actual: 1 Data: (27, 1, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7, 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 1 Actual: 1 Data: (3, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 1 Actual: 1 Data: (4, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 0 Actual: 0 Data: (9, 1, 2, 0, 3, 1, 2, 1, 2, 2, 1, 1, 3, 1, 1, 1, 2, 3, 0, 4, 1, 5, 1)  
 Predicted: 0 Actual: 0 Data: (35, 1, 2, 1, 0, 2, 1, 3, 4, 0, 5, 1, 2, 1, 3, 2, 1, 0, 1, 3, 1, 2, 1)  
 Predicted: 0 Actual: 0 Data: (16, 0, 0, 2, 1, 3, 1, 5, 1, 1, 1, 0, 2, 3, 3, 1, 1, 1, 2, 1, 0, 1, 3)  
 Predicted: 1 Actual: 1 Data: (0, 0, 1, 3, 4, 5, 4, 4, 3, 5, 4, 3, 5, 4, 4, 2, 1, 0, 3, 6, 1, 0, 5)  
 Predicted: 0 Actual: 0 Data: (19, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 0, 0, 0, 1, 2, 1, 4, 0, 4, 0, 0)  
 Predicted: 0 Actual: 0 Data: (19, 0, 1, 2, 4, 1, 0, 0, 0, 0, 3, 2, 1, 3, 1, 0, 2, 3, 5, 0, 2, 1, 1)  
 Predicted: 0 Actual: 0 Data: (8, 0, 1, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0, 1, 2, 3, 4, 0, 1, 2, 3)  
 Predicted: 2 Actual: 2 Data: (16, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 0 Actual: 0 Data: (14, 0, 1, 3, 4, 3, 2, 1, 1, 3, 2, 1, 1, 3, 2, 3, 1, 1, 2, 0, 1, 2, 3)  
 Predicted: 1 Actual: 1 Data: (14, 0, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7, 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 0 Actual: 0 Data: (31, 0, 2, 0, 3, 1, 2, 1, 2, 2, 1, 1, 3, 1, 1, 1, 2, 3, 0, 4, 1, 5, 1)  
 Predicted: 2 Actual: 2 Data: (11, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (19, 1, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 1 Actual: 1 Data: (14, 0, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7, 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 1 Actual: 1 Data: (16, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)

Predicted: 0 Actual: 0 Data: (7, 1, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0, 2, 1, 1, 3, 1, 1, 2, 3, 2)  
 Predicted: 0 Actual: 0 Data: (16, 1, 1, 0, 1, 0, 1, 0, 1, 2, 1, 3, 1, 0, 2, 3, 4, 0, 2, 1, 0, 1, 1)  
 Predicted: 2 Actual: 2 Data: (10, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 2 Actual: 2 Data: (2, 1, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 2 Actual: 2 Data: (17, 0, 5, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 4, 6, 5, 6, 7, 6, 5, 1)  
 Predicted: 1 Actual: 1 Data: (9, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 0, 4)  
 Predicted: 0 Actual: 0 Data: (16, 1, 1, 0, 1, 0, 1, 0, 1, 2, 1, 3, 1, 0, 2, 3, 4, 0, 2, 1, 0, 1, 1)  
 Predicted: 1 Actual: 1 Data: (19, 1, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 2 Actual: 2 Data: (27, 1, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 1 Actual: 1 Data: (10, 1, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 2 Actual: 2 Data: (7, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 0 Actual: 0 Data: (16, 1, 1, 0, 1, 0, 1, 0, 1, 2, 1, 3, 1, 0, 2, 3, 4, 0, 2, 1, 0, 1, 1)  
 Predicted: 1 Actual: 1 Data: (10, 0, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 0 Actual: 0 Data: (4, 1, 1, 0, 2, 3, 2, 4, 2, 1, 5, 0, 0, 1, 2, 1, 0, 2, 1, 3, 1, 0, 0)  
 Predicted: 0 Actual: 0 Data: (24, 0, 0, 1, 3, 4, 5, 4, 4, 3, 5, 3, 6, 1, 2, 7, 6, 2, 7, 2, 1, 2, 0)  
 Predicted: 1 Actual: 1 Data: (16, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 2 Actual: 2 Data: (11, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (13, 1, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7, 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 2 Actual: 2 Data: (15, 0, 5, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)  
 Predicted: 0 Actual: 0 Data: (9, 1, 2, 0, 3, 1, 2, 1, 2, 2, 1, 1, 3, 1, 1, 1, 2, 3, 0, 4, 1, 5, 1)  
 Predicted: 2 Actual: 2 Data: (11, 1, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 2 Actual: 2 Data: (18, 1, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 1 Actual: 1 Data: (3, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)

Predicted: 0 Actual: 0 Data: (7, 1, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0, 2, 1, 1, 3, 1, 1, 2, 3, 2)  
 Predicted: 0 Actual: 0 Data: (6, 1, 2, 1, 1, 0, 0, 0, 0, 0, 3, 1, 2, 5, 1, 0, 1, 2, 3, 1, 0, 0, 0)  
 Predicted: 2 Actual: 2 Data: (9, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 2 Actual: 2 Data: (14, 0, 5, 6, 6, 6, 6, 5, 6, 6, 3, 7, 6, 6, 3, 3, 4, 5, 4, 4, 3, 5, 4)  
 Predicted: 0 Actual: 0 Data: (16, 0, 0, 2, 1, 3, 1, 5, 1, 1, 1, 0, 2, 3, 3, 1, 1, 1, 2, 1, 0, 1, 3)  
 Predicted: 0 Actual: 0 Data: (14, 0, 1, 3, 4, 3, 2, 1, 1, 3, 2, 1, 1, 3, 2, 3, 1, 1, 2, 0, 1, 2, 3)  
 Predicted: 0 Actual: 0 Data: (8, 0, 1, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0, 1, 2, 3, 4, 0, 1, 2, 3)  
 Predicted: 2 Actual: 2 Data: (17, 0, 5, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 4, 6, 5, 6, 7, 6, 5, 1)  
 Predicted: 2 Actual: 2 Data: (10, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 0 Actual: 0 Data: (14, 0, 1, 3, 4, 3, 2, 1, 1, 3, 2, 1, 1, 3, 2, 3, 1, 1, 2, 0, 1, 2, 3)  
 Predicted: 2 Actual: 2 Data: (25, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 1 Actual: 1 Data: (13, 0, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 2 Actual: 2 Data: (16, 0, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (25, 1, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 0 Actual: 0 Data: (27, 0, 3, 1, 2, 1, 0, 1, 2, 1, 0, 4, 0, 3, 1, 5, 0, 1, 3, 1, 0, 1, 2)  
 Predicted: 2 Actual: 2 Data: (27, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 1 Actual: 1 Data: (19, 1, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 2 Actual: 2 Data: (31, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 2 Actual: 2 Data: (6, 0, 5, 7, 6, 6, 5, 6, 6, 2, 7, 6, 8, 5, 4, 1, 4, 1, 2, 1, 0, 6, 5)  
 Predicted: 2 Actual: 2 Data: (3, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 1 Actual: 1 Data: (17, 1, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 1 Actual: 1 Data: (14, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 1 Actual: 1 Data: (16, 0, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)

Predicted: 1 Actual: 1 Data: (12, 1, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 0 Actual: 0 Data: (19, 1, 2, 1, 2, 1, 2, 1, 2, 1, 2, 1, 0, 0, 0, 1, 2, 1, 4, 0, 4, 0, 0)  
 Predicted: 1 Actual: 1 Data: (10, 1, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 2 Actual: 2 Data: (3, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 2 Actual: 2 Data: (14, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 2 Actual: 2 Data: (24, 0, 5, 6, 6, 6, 6, 5, 6, 6, 3, 7, 6, 6, 3, 3, 4, 5, 4, 4, 3, 5, 4)  
 Predicted: 0 Actual: 0 Data: (10, 0, 5, 6, 7, 6, 5, 6, 6, 1, 3, 2, 6, 7, 1, 2, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 2 Actual: 2 Data: (26, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (24, 1, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 2 Actual: 2 Data: (18, 1, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 1 Actual: 1 Data: (24, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 1 Actual: 1 Data: (24, 1, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 1 Actual: 1 Data: (23, 0, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 2 Actual: 2 Data: (26, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (0, 0, 1, 3, 4, 5, 4, 4, 3, 5, 4, 3, 5, 4, 4, 2, 1, 0, 3, 6, 1, 0, 5)  
 Predicted: 2 Actual: 2 Data: (18, 0, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)  
 Predicted: 2 Actual: 2 Data: (16, 1, 1, 5, 1, 2, 5, 5, 5, 3, 5, 7, 6, 5, 4, 4, 3, 5, 4, 3, 5, 4, 6)  
 Predicted: 2 Actual: 2 Data: (31, 0, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (10, 1, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 2 Actual: 2 Data: (26, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 0 Actual: 0 Data: (6, 1, 0, 1, 1, 2, 1, 3, 1, 2, 1, 0, 0, 0, 0, 0, 0, 1, 2, 3, 4, 1, 0)  
 Predicted: 2 Actual: 2 Data: (20, 1, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 1 Actual: 1 Data: (23, 0, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)

Predicted: 2 Actual: 2 Data: (2, 1, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8,  
 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (35, 0, 2, 1, 0, 2, 1, 3, 4, 0, 5, 1, 2,  
 1, 3, 2, 1, 0, 1, 3, 1, 2, 1)  
 Predicted: 1 Actual: 1 Data: (24, 1, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2,  
 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 2 Actual: 2 Data: (8, 0, 5, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7,  
 3, 1, 2, 0, 3, 4, 5, 6, 4)  
 Predicted: 2 Actual: 2 Data: (27, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6,  
 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 1 Actual: 1 Data: (25, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3,  
 3, 0, 1, 3, 5, 4, 3, 1, 0, 4)  
 Predicted: 2 Actual: 2 Data: (16, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3,  
 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 2 Actual: 2 Data: (9, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6,  
 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 1 Actual: 1 Data: (14, 0, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7,  
 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 1 Actual: 1 Data: (27, 1, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7,  
 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 2 Actual: 2 Data: (18, 1, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6,  
 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 0 Actual: 0 Data: (4, 1, 1, 0, 2, 3, 2, 4, 2, 1, 5, 0, 0, 1,  
 2, 1, 0, 2, 1, 3, 1, 0, 0)  
 Predicted: 0 Actual: 0 Data: (5, 1, 3, 1, 2, 3, 1, 2, 1, 3, 1, 3, 1, 3,  
 0, 2, 3, 1, 3, 1, 3, 2, 0)  
 Predicted: 0 Actual: 0 Data: (34, 1, 1, 2, 3, 1, 0, 0, 1, 3, 2, 1, 0,  
 4, 1, 0, 2, 1, 0, 2, 1, 0, 1)  
 Predicted: 0 Actual: 0 Data: (9, 0, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0,  
 2, 1, 1, 3, 1, 1, 2, 3, 2)  
 Predicted: 1 Actual: 1 Data: (39, 0, 4, 5, 5, 4, 5, 4, 5, 4, 7, 4, 4,  
 4, 3, 2, 5, 1, 0, 1, 0, 5, 1)  
 Predicted: 2 Actual: 2 Data: (25, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6,  
 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 1 Actual: 1 Data: (18, 0, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2,  
 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 2 Actual: 2 Data: (21, 0, 1, 3, 4, 5, 4, 4, 3, 5, 6, 6, 1,  
 2, 6, 6, 6, 2, 7, 8, 0, 5, 1)  
 Predicted: 2 Actual: 2 Data: (14, 0, 5, 6, 6, 6, 6, 5, 6, 6, 3, 7, 6,  
 6, 3, 3, 4, 5, 4, 4, 3, 5, 4)  
 Predicted: 2 Actual: 2 Data: (21, 0, 1, 3, 4, 5, 4, 4, 3, 5, 6, 6, 1,  
 2, 6, 6, 6, 2, 7, 8, 0, 5, 1)  
 Predicted: 2 Actual: 2 Data: (23, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6,  
 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 1 Actual: 1 Data: (16, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3,  
 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)

Predicted: 2 Actual: 2 Data: (7, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (30, 1, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 1 Actual: 1 Data: (17, 1, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 2 Actual: 2 Data: (11, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 1 Actual: 1 Data: (23, 0, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 0 Actual: 0 Data: (10, 0, 5, 6, 7, 6, 5, 6, 6, 1, 3, 2, 6, 7, 1, 2, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 0 Actual: 0 Data: (2, 1, 2, 1, 0, 2, 1, 0, 2, 1, 0, 1, 1, 1, 1, 1, 0, 2, 3, 3, 0, 3, 0)  
 Predicted: 2 Actual: 2 Data: (28, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 0 Actual: 0 Data: (19, 0, 1, 2, 4, 1, 0, 0, 0, 0, 3, 2, 1, 3, 1, 0, 2, 3, 5, 0, 2, 1, 1)  
 Predicted: 2 Actual: 2 Data: (2, 1, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (8, 0, 1, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0, 1, 2, 3, 4, 0, 1, 2, 3)  
 Predicted: 2 Actual: 2 Data: (8, 1, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 2 Actual: 2 Data: (15, 0, 5, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)  
 Predicted: 0 Actual: 0 Data: (9, 1, 2, 0, 3, 1, 2, 1, 2, 2, 1, 1, 3, 1, 1, 1, 2, 3, 0, 4, 1, 5, 1)  
 Predicted: 2 Actual: 2 Data: (8, 1, 7, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (27, 0, 3, 1, 2, 1, 0, 1, 2, 1, 0, 4, 0, 3, 1, 5, 0, 1, 3, 1, 0, 1, 2)  
 Predicted: 0 Actual: 0 Data: (26, 1, 1, 2, 0, 2, 1, 4, 1, 0, 1, 0, 1, 4, 2, 1, 0, 1, 2, 0, 2, 3, 1)  
 Predicted: 2 Actual: 2 Data: (15, 0, 5, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)  
 Predicted: 2 Actual: 2 Data: (11, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (3, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 0 Actual: 0 Data: (24, 1, 0, 1, 3, 4, 5, 4, 4, 3, 5, 3, 6, 1, 2, 7, 6, 2, 7, 2, 1, 2, 0)  
 Predicted: 2 Actual: 2 Data: (7, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 0 Actual: 0 Data: (13, 0, 1, 2, 5, 6, 6, 6, 6, 1, 3, 2, 6, 3, 1, 0, 2, 1, 1, 0, 1, 4, 0)

Predicted: 0 Actual: 0 Data: (1, 1, 0, 1, 2, 3, 3, 2, 1, 0, 2, 1, 0, 1, 0, 2, 2, 1, 0, 2, 1, 0, 0)  
 Predicted: 2 Actual: 2 Data: (35, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 2 Actual: 2 Data: (11, 1, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 2 Actual: 2 Data: (27, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 0 Actual: 0 Data: (6, 1, 0, 1, 1, 2, 1, 3, 1, 2, 1, 0, 0, 0, 0, 0, 0, 1, 2, 3, 4, 1, 0)  
 Predicted: 2 Actual: 2 Data: (35, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 2 Actual: 2 Data: (8, 1, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 1 Actual: 1 Data: (24, 1, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 0 Actual: 0 Data: (6, 1, 0, 1, 1, 2, 1, 3, 1, 2, 1, 0, 0, 0, 0, 0, 0, 1, 2, 3, 4, 1, 0)  
 Predicted: 1 Actual: 1 Data: (4, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 1 Actual: 1 Data: (17, 1, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 2 Actual: 2 Data: (35, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (34, 0, 1, 2, 3, 1, 0, 0, 1, 3, 2, 1, 0, 4, 1, 0, 2, 1, 0, 2, 1, 0, 1)  
 Predicted: 2 Actual: 2 Data: (18, 1, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 0 Actual: 0 Data: (16, 0, 0, 2, 1, 3, 1, 5, 1, 1, 1, 0, 2, 3, 3, 1, 1, 1, 2, 1, 0, 1, 3)  
 Predicted: 2 Actual: 2 Data: (37, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 1 Actual: 1 Data: (27, 1, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7, 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 0 Actual: 0 Data: (19, 0, 1, 2, 4, 1, 0, 0, 0, 0, 3, 2, 1, 3, 1, 0, 2, 3, 5, 0, 2, 1, 1)  
 Predicted: 0 Actual: 0 Data: (21, 0, 1, 0, 1, 2, 3, 2, 1, 0, 0, 0, 5, 1, 0, 0, 0, 1, 0, 1, 2, 0, 1)  
 Predicted: 2 Actual: 2 Data: (16, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 0 Actual: 0 Data: (9, 0, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0, 2, 1, 1, 3, 1, 1, 2, 3, 2)  
 Predicted: 1 Actual: 1 Data: (4, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 2 Actual: 2 Data: (10, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)

Predicted: 0 Actual: 0 Data: (34, 0, 1, 2, 3, 1, 0, 0, 1, 3, 2, 1, 0, 4, 1, 0, 2, 1, 0, 2, 1, 0, 1)  
 Predicted: 0 Actual: 0 Data: (9, 1, 2, 0, 3, 1, 2, 1, 2, 2, 1, 1, 3, 1, 1, 1, 2, 3, 0, 4, 1, 5, 1)  
 Predicted: 1 Actual: 1 Data: (24, 1, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 1 Actual: 1 Data: (1, 0, 2, 0, 4, 2, 3, 1, 1, 1, 1, 3, 1, 2, 0, 2, 6, 7, 5, 1, 0, 6, 1)  
 Predicted: 0 Actual: 0 Data: (13, 0, 1, 2, 5, 6, 6, 6, 6, 1, 3, 2, 6, 3, 1, 0, 2, 1, 1, 0, 1, 4, 0)  
 Predicted: 1 Actual: 1 Data: (25, 1, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
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 Predicted: 2 Actual: 2 Data: (25, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 1 Actual: 1 Data: (13, 1, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7, 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 0 Actual: 0 Data: (21, 0, 1, 0, 1, 2, 3, 2, 1, 0, 0, 0, 5, 1, 0, 0, 0, 1, 0, 1, 2, 0, 1)  
 Predicted: 1 Actual: 1 Data: (30, 1, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 4)  
 Predicted: 0 Actual: 0 Data: (16, 0, 0, 2, 1, 3, 1, 5, 1, 1, 1, 0, 2, 3, 3, 1, 1, 1, 2, 1, 0, 1, 3)  
 Predicted: 0 Actual: 0 Data: (23, 0, 1, 2, 1, 0, 2, 1, 0, 1, 6, 5, 1, 1, 1, 1, 2, 1, 0, 1, 2, 1, 2)  
 Predicted: 1 Actual: 1 Data: (30, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 2 Actual: 2 Data: (28, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 2 Actual: 2 Data: (14, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 2 Actual: 2 Data: (8, 1, 7, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 1 Actual: 1 Data: (9, 0, 1, 2, 3, 1, 3, 2, 2, 2, 1, 2, 3, 3, 0, 1, 3, 5, 4, 3, 1, 0, 4)  
 Predicted: 2 Actual: 2 Data: (23, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 1 Actual: 1 Data: (35, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 1 Actual: 1 Data: (23, 0, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 0 Actual: 0 Data: (33, 0, 2, 0, 0, 0, 1, 2, 3, 0, 2, 1, 3, 2, 1, 4, 1, 0, 1, 2, 3, 4, 1)  
 Predicted: 2 Actual: 2 Data: (17, 0, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)



Predicted: 0 Actual: 0 Data: (14, 0, 1, 3, 4, 3, 2, 1, 1, 3, 2, 1, 1, 3, 2, 3, 1, 1, 2, 0, 1, 2, 3)  
 Predicted: 2 Actual: 2 Data: (25, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (33, 0, 2, 0, 0, 0, 1, 2, 3, 0, 2, 1, 3, 2, 1, 4, 1, 0, 1, 2, 3, 4, 1)  
 Predicted: 2 Actual: 2 Data: (26, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 2 Actual: 2 Data: (37, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 2 Actual: 2 Data: (8, 0, 5, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 7, 3, 1, 2, 0, 3, 4, 5, 6, 4)  
 Predicted: 2 Actual: 2 Data: (8, 1, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 1 Actual: 1 Data: (12, 1, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 2 Actual: 2 Data: (18, 0, 5, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 4, 6, 5, 6, 7, 6, 5, 1)  
 Predicted: 2 Actual: 2 Data: (16, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 2 Actual: 2 Data: (8, 1, 7, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (30, 0, 2, 1, 0, 1, 2, 4, 0, 1, 6, 1, 0, 0, 0, 0, 0, 2, 1, 2, 1, 2, 2)  
 Predicted: 2 Actual: 2 Data: (3, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 2 Actual: 2 Data: (35, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (22, 1, 3, 1, 2, 3, 1, 2, 1, 3, 1, 3, 1, 3, 0, 2, 3, 1, 3, 1, 3, 2, 0)  
 Predicted: 1 Actual: 1 Data: (17, 1, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 2 Actual: 2 Data: (7, 1, 3, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
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 Predicted: 1 Actual: 1 Data: (39, 0, 4, 5, 5, 4, 5, 4, 5, 4, 7, 4, 4, 4, 3, 2, 5, 1, 0, 1, 0, 5, 1)  
 Predicted: 2 Actual: 2 Data: (18, 1, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 1 Actual: 1 Data: (14, 0, 0, 5, 6, 7, 6, 5, 6, 6, 2, 3, 7, 6, 2, 1, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 1 Actual: 1 Data: (19, 1, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 0 Actual: 0 Data: (33, 0, 2, 0, 0, 0, 1, 2, 3, 0, 2, 1, 3, 2, 1, 4, 1, 0, 1, 2, 3, 4, 1)

Predicted: 2 Actual: 2 Data: (21, 0, 1, 3, 4, 5, 4, 4, 3, 5, 6, 6, 1, 2, 6, 6, 6, 2, 7, 8, 0, 5, 1)  
 Predicted: 2 Actual: 2 Data: (18, 1, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 1 Actual: 1 Data: (1, 0, 2, 0, 4, 2, 3, 1, 1, 1, 1, 3, 1, 2, 0, 2, 6, 7, 5, 1, 0, 6, 1)  
 Predicted: 1 Actual: 1 Data: (13, 0, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 1 Actual: 1 Data: (3, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 2 Actual: 2 Data: (28, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 2 Actual: 2 Data: (20, 1, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (34, 0, 1, 2, 3, 1, 0, 0, 1, 3, 2, 1, 0, 4, 1, 0, 2, 1, 0, 2, 1, 0, 1)  
 Predicted: 2 Actual: 2 Data: (6, 0, 5, 7, 6, 6, 5, 6, 6, 2, 7, 6, 8, 5, 4, 1, 4, 1, 2, 1, 0, 6, 5)  
 Predicted: 0 Actual: 0 Data: (9, 1, 2, 0, 3, 1, 2, 1, 2, 2, 1, 1, 3, 1, 1, 1, 2, 3, 0, 4, 1, 5, 1)  
 Predicted: 1 Actual: 1 Data: (16, 0, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 0 Actual: 0 Data: (1, 1, 0, 1, 2, 3, 3, 2, 1, 0, 2, 1, 0, 1, 0, 2, 2, 1, 0, 2, 1, 0, 0)  
 Predicted: 0 Actual: 0 Data: (34, 0, 1, 2, 3, 1, 0, 0, 1, 3, 2, 1, 0, 4, 1, 0, 2, 1, 0, 2, 1, 0, 1)  
 Predicted: 1 Actual: 1 Data: (12, 1, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 0 Actual: 0 Data: (10, 0, 5, 6, 7, 6, 5, 6, 6, 1, 3, 2, 6, 7, 1, 2, 5, 3, 1, 2, 0, 1, 0)  
 Predicted: 1 Actual: 1 Data: (4, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
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 Predicted: 1 Actual: 1 Data: (3, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 0 Actual: 0 Data: (19, 1, 4, 1, 2, 0, 1, 2, 4, 1, 1, 4, 0, 2, 0, 0, 0, 0, 0, 2, 1, 3, 1)  
 Predicted: 2 Actual: 2 Data: (8, 1, 7, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (5, 1, 3, 1, 2, 3, 1, 2, 1, 3, 1, 3, 1, 3, 0, 2, 3, 1, 3, 1, 3, 2, 0)  
 Predicted: 0 Actual: 0 Data: (27, 0, 3, 1, 2, 1, 0, 1, 2, 1, 0, 4, 0, 3, 1, 5, 0, 1, 3, 1, 0, 1, 2)  
 Predicted: 2 Actual: 2 Data: (18, 0, 5, 6, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 4, 6, 5, 6, 7, 6, 5, 1)

Predicted: 2 Actual: 2 Data: (35, 0, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 0 Actual: 0 Data: (30, 0, 2, 1, 0, 1, 2, 4, 0, 1, 6, 1, 0, 0, 0, 0, 2, 1, 2, 1, 2, 2)  
 Predicted: 2 Actual: 2 Data: (11, 1, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 1 Actual: 1 Data: (19, 1, 1, 0, 4, 2, 1, 2, 1, 3, 0, 3, 1, 3, 5, 6, 1, 4, 7, 0, 2, 1, 2)  
 Predicted: 2 Actual: 2 Data: (3, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 1 Actual: 1 Data: (16, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 2 Actual: 2 Data: (21, 0, 1, 3, 4, 5, 4, 4, 3, 5, 6, 6, 1, 2, 6, 6, 6, 2, 7, 8, 0, 5, 1)  
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 Predicted: 0 Actual: 0 Data: (26, 1, 1, 2, 0, 2, 1, 4, 1, 0, 1, 0, 1, 4, 2, 1, 0, 1, 2, 0, 2, 3, 1)  
 Predicted: 1 Actual: 1 Data: (24, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 2 Actual: 2 Data: (20, 1, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 1 Actual: 1 Data: (30, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 2 Actual: 2 Data: (26, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 1 Actual: 1 Data: (8, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 1 Actual: 1 Data: (20, 0, 3, 4, 5, 5, 4, 3, 5, 5, 5, 5, 5, 5, 4, 2, 1, 3, 2, 0, 6, 4, 5)  
 Predicted: 1 Actual: 1 Data: (24, 1, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 1 Actual: 1 Data: (24, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 1 Actual: 1 Data: (30, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)  
 Predicted: 0 Actual: 0 Data: (16, 0, 0, 2, 1, 3, 1, 5, 1, 1, 1, 0, 2, 3, 3, 1, 1, 1, 2, 1, 0, 1, 3)  
 Predicted: 2 Actual: 2 Data: (20, 1, 5, 7, 6, 6, 6, 5, 6, 6, 7, 6, 6, 8, 2, 1, 3, 0, 3, 1, 3, 1, 2)  
 Predicted: 1 Actual: 1 Data: (24, 0, 2, 1, 3, 1, 2, 1, 2, 2, 1, 1, 2, 2, 3, 4, 5, 4, 4, 3, 5, 4, 3)  
 Predicted: 1 Actual: 1 Data: (13, 0, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 1 Actual: 1 Data: (19, 0, 5, 7, 6, 6, 6, 5, 1, 3, 0, 1, 3, 2, 1, 6, 5, 4, 0, 8, 2, 3, 1)

Predicted: 2 Actual: 2 Data: (14, 0, 5, 7, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 7, 5, 4, 6, 1, 3, 2, 0, 3)  
 Predicted: 0 Actual: 0 Data: (27, 0, 3, 1, 2, 1, 0, 1, 2, 1, 0, 4, 0, 3, 1, 5, 0, 1, 3, 1, 0, 1, 2)  
 Predicted: 2 Actual: 2 Data: (23, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 1 Actual: 1 Data: (6, 0, 1, 3, 4, 5, 4, 4, 3, 5, 4, 3, 5, 4, 4, 2, 1, 0, 3, 6, 1, 0, 5)  
 Predicted: 0 Actual: 0 Data: (19, 1, 4, 1, 2, 0, 1, 2, 4, 1, 1, 4, 0, 2, 0, 0, 0, 0, 0, 2, 1, 3, 1)  
 Predicted: 2 Actual: 2 Data: (6, 0, 5, 7, 6, 6, 5, 6, 6, 2, 7, 6, 8, 5, 4, 1, 4, 1, 2, 1, 0, 6, 5)  
 Predicted: 0 Actual: 0 Data: (7, 1, 2, 0, 3, 2, 1, 2, 3, 2, 0, 3, 2, 0, 2, 1, 1, 3, 1, 1, 2, 3, 2)  
 Predicted: 2 Actual: 2 Data: (28, 0, 5, 4, 5, 4, 4, 3, 5, 6, 1, 2, 3, 7, 6, 6, 7, 1, 0, 3, 5, 6, 1)  
 Predicted: 2 Actual: 2 Data: (16, 1, 1, 5, 1, 2, 5, 5, 5, 3, 5, 7, 6, 5, 4, 4, 3, 5, 4, 3, 5, 4, 6)  
 Predicted: 0 Actual: 0 Data: (16, 1, 1, 0, 1, 0, 1, 0, 1, 2, 1, 3, 1, 0, 2, 3, 4, 0, 2, 1, 0, 1, 1)  
 Predicted: 2 Actual: 2 Data: (11, 1, 5, 6, 6, 6, 6, 5, 6, 6, 6, 6, 6, 6, 1, 6, 5, 6, 5, 6, 1, 2, 0)  
 Predicted: 0 Actual: 0 Data: (24, 1, 0, 1, 3, 4, 5, 4, 4, 3, 5, 3, 6, 1, 2, 7, 6, 2, 7, 2, 1, 2, 0)  
 Predicted: 2 Actual: 2 Data: (10, 0, 5, 6, 6, 6, 6, 5, 6, 6, 6, 7, 6, 6, 4, 2, 1, 6, 7, 1, 3, 4, 2)  
 Predicted: 0 Actual: 0 Data: (19, 1, 4, 1, 2, 0, 1, 2, 4, 1, 1, 4, 0, 2, 0, 0, 0, 0, 0, 2, 1, 3, 1)  
 Predicted: 1 Actual: 1 Data: (10, 1, 0, 5, 6, 4, 2, 1, 5, 1, 2, 2, 1, 1, 2, 2, 6, 6, 3, 7, 6, 6, 4)  
 Predicted: 1 Actual: 1 Data: (39, 0, 4, 5, 5, 4, 5, 4, 5, 4, 7, 4, 4, 4, 3, 2, 5, 1, 0, 1, 0, 5, 1)  
 Predicted: 1 Actual: 1 Data: (39, 0, 4, 5, 5, 4, 5, 4, 5, 4, 7, 4, 4, 4, 3, 2, 5, 1, 0, 1, 0, 5, 1)

## Implementation and Deployment

Once the PDA is run and the best performing model is chosen for predicting an individual's risk to cancer the program is then implemented as a GUI.

1. The program is first implemented into a GUI with the Tkinter software tool
2. Deployment will also be done by using Tkinter and publishing on the google collab as seen here

All can be seen here:

<https://drive.google.com/drive/folders/1bUaVGU3Xwcn4ZPu7I1reVZsPTzx6Web->

## **Conclusion/ Reflection**

The task was completed, and the accuracy of the data was high, further validating it. The GUI was able to output the correct predictions and as the accuracy was high this helped achieve the task at hand. The tool built will help individuals who are curious of how prone they are to being diagnosed with cancer get an understanding of how their habits are affecting their chances. This will overall help raise awareness about this real world problem and overall in the long run achieve less rates of diagnosis for cancer. Overall the report has achieved it's projected outcome and the task given was done with integrity and accuracy.

## **Journal:**

Week 7: We have received the assignment Capstone Project For ST1 I will attempt to look for a data set relatively soon and obtain more knowledge about GUIs by using the lecture/Tutorial content

Week 8: I have not been able to dedicate any time to work on my Project as I have been busy with other school work but hoping by next week to make more progress.

Week 9: I have come up with the five questions for a dataset about cars found on kaggle, this is good progress as it will set me up for the following weeks to reach my goal.

Week 10: I decided to change my dataset to the lung cancer risks, this decision was made because my old data set seemed too inaccurate and had no end goal. I am yet to come up with anything for this data set but hoping to start making progress on it next week.

Week 11: I have came up with 5 questions and ran a EDA for the data set during this week which will help with my developmental plan, I am hoping to run my PDA in the coming week and make my GUI on week 13

Week 12: The PDA was run this week and I am on track to finishing the assignment on time. The report is being written slowly in the meantime and will be complete and ready for submission.

Week 13: I have made my GUI and tested it. All that is left now is the report and the presentation which I will be finishing this week. I had to do my presentation at a later date than the usual time due work related reasons however this is still good since I am confident i will had the assignment in on time

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