

# Notebook

December 24, 2024

## 1 Import libraries

```
import os
import sys
import cv2
import math
import json
import joblib
import nbformat
import numpy as np
import pandas as pd
import seaborn as sns
from tqdm import tqdm
from sklearn.svm import SVC
from datetime import datetime
import matplotlib.pyplot as plt
from nbconvert.exporters import PDFExporter
from skimage.feature import hog as skimage_hog
from sklearn.preprocessing import LabelEncoder
from IPython.display import display, Javascript
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import GridSearchCV
from sklearn.metrics import classification_report, confusion_matrix
from scipy.spatial.distance import cityblock, cosine, sqeuclidean, euclidean
```

## 2 Load data

```
project_dir = os.getcwd()
project_dir = os.path.dirname(project_dir)
```

```
width = 64
height = 64
```

```
data_dir = project_dir + "\\data"

train_path = os.path.join(data_dir, "train")
```

```

test_path = os.path.join(data_dir, "test")

train_images = []
test_images = []

train_labels = []
test_labels = []

for path in (train_path, test_path):
    if (path.split('\\')[-1] == "train"):
        for dir in os.listdir(path):
            label_path = os.path.join(path, dir)
            label = dir.split('\\')[-1]
            for image in os.listdir(label_path):
                image_path = os.path.join(label_path, image)
                image = cv2.imread(image_path)
                image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
                image = cv2.resize(image, (width, height))
                train_images.append(image)
                train_labels.append(label)
    else:
        for dir in os.listdir(path):
            label_path = os.path.join(path, dir)
            label = dir.split('\\')[-1]
            for image in os.listdir(label_path):
                image_path = os.path.join(label_path, image)
                image = cv2.imread(image_path)
                image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
                image = cv2.resize(image, (width, height))
                test_images.append(image)
                test_labels.append(label)

```

```

label_encoder = LabelEncoder()
train_labels_encoded = label_encoder.fit_transform(train_labels)
test_labels_encoded = label_encoder.transform(test_labels)

```

```

joblib.dump(train_images, project_dir + '\\joblib\\train_images.joblib')
joblib.dump(test_images, project_dir + '\\joblib\\test_images.joblib')
joblib.dump(train_labels_encoded, project_dir + '\\joblib\\train_labels_encoded.
↪joblib')
joblib.dump(test_labels_encoded, project_dir + '\\joblib\\test_labels_encoded.
↪joblib')
joblib.dump(label_encoder, project_dir + '\\joblib\\label_encoder.joblib')

```

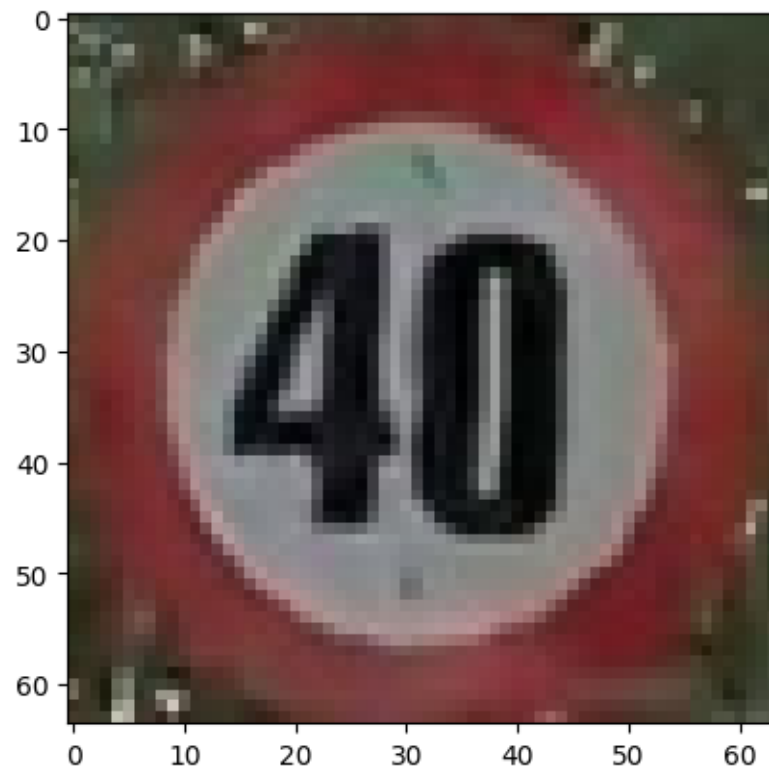
```

['d:\\ASUS\\Deploy-Traffic-Sign-Classification-through-
Images\\joblib\\label_encoder.joblib']

```

```
plt.imshow(test_images[0])
```

<matplotlib.image.AxesImage at 0x2418dc85ed0>



```
plt.imshow(train_images[1])
```

<matplotlib.image.AxesImage at 0x2418d140520>



### 3 Extract features

```
# def blur_image(image):  
#     blurred_image = cv2.medianBlur(image, 5)  
#     return blurred_image
```

```
# plt.imshow(blur_image(test_images[0]))
```

```
# plt.imshow(blur_image(train_images[1]))
```

```
def blur_image(image):  
    blurred_image = cv2.GaussianBlur(image, (5,5), 0)  
    return blurred_image
```

```
# plt.imshow(blur_image1(test_images[0]))
```

```
# plt.imshow(blur_image1(train_images[1]))
```

```
def color_histogram(image):  
    # image = cv2.cvtColor(image, cv2.COLOR_RGB2LUV)
```

```

row, column, channel = image.shape[:3]
size = row * column
feature = []
for k in range(channel):
    histogram = np.squeeze(cv2.calcHist([image], [k], None, [32], [0, 256]))
    histogram = histogram / size
    feature.extend(histogram)
return feature

```

```

# def plot_color_histogram(image):

#     fig, axs = plt.subplots(2, 2, figsize=(12, 10))

#     num_pixels = image.shape[0] * image.shape[1]

#     color = ("r", "g", "b")
#     for k, clr in enumerate(color):
#         histogram = np.squeeze(cv2.calcHist([image], [k], None, [256], [0,
↪256]))
#         histogram = histogram / num_pixels
#         axs[0, 0].plot(histogram, color=clr)
#         axs[0, 0].set_xlim(0, 256)
#         axs[0, 0].set_title('Histogram tổng quát RGB')

#     titles = ['Red Channel', 'Green Channel', 'Blue Channel']
#     positions = [(0, 1), (1, 0), (1, 1)]

#     for idx, (clr, title, pos) in enumerate(zip(color, titles, positions)):
#         histogram = np.squeeze(cv2.calcHist([image], [idx], None, [256], [0,
↪256]))
#         histogram = histogram / num_pixels
#         axs[pos].plot(histogram, color=clr)
#         axs[pos].set_xlim(0, 256)
#         axs[pos].set_title(f"{title}")

#     plt.tight_layout()
#     plt.show()

```

```

# plot_color_histogram(train_images[0])

```

```

def hog(image):
    # image = cv2.cvtColor(image, cv2.COLOR_RGB2LUV)
    hog_features = skimage_hog(image, orientations=9, pixels_per_cell=(8, 8),
↪cells_per_block=(2, 2), visualize=False, block_norm='L2-Hys',
↪transform_sqrt=True, channel_axis=2)
    return hog_features

```

```
# _, image1 = hog(blur_image(train_images[1]))
# plt.imshow(image1, cmap=plt.cm.gray)
```

```
# _, image2 = hog(blur_image1(train_images[1]))
# plt.imshow(image2, cmap=plt.cm.gray)
```

```
def extract_features(images):
    blurred_images = [blur_image(image) for image in tqdm(images, desc="Blur_
↳Images")]
    color_features = [color_histogram(image) for image in tqdm(blurred_images,
↳desc="Extracting Color Features")]
    hog_features = [hog(image) for image in tqdm(blurred_images,
↳desc="Extracting HOG Features")]
    combined_features = [np.concatenate((color_feature, hog_feature))
                          for color_feature, hog_feature in
↳tqdm(zip(color_features, hog_features), desc="Combining Features")]

    return combined_features
```

```
train_features = extract_features(train_images)
joblib.dump(train_features, project_dir + '\\joblib\\train_features.joblib')
```

```
Blur Images: 100%|      | 1416/1416 [00:00<00:00, 22786.91it/s]
Extracting Color Features: 100%|      | 1416/1416 [00:00<00:00,
14873.23it/s]
Extracting HOG Features: 100%|      | 1416/1416 [00:04<00:00, 351.70it/s]
Combining Features: 1416it [00:00, 49553.90it/s]
```

```
['d:\\ASUS\\Deploy-Traffic-Sign-Classification-through-
Images\\joblib\\train_features.joblib']
```

```
test_features = extract_features(test_images)
joblib.dump(test_features, project_dir + '\\joblib\\test_features.joblib')
```

```
Blur Images: 100%|      | 149/149 [00:00<00:00, 21046.38it/s]
Extracting Color Features: 100%|      | 149/149 [00:00<00:00, 18574.86it/s]
Extracting HOG Features: 100%|      | 149/149 [00:00<00:00, 358.28it/s]
Combining Features: 149it [00:00, ?it/s]
```

```
['d:\\ASUS\\Deploy-Traffic-Sign-Classification-through-
Images\\joblib\\test_features.joblib']
```

## 4 Distance metrics KNN

```
def chi_square_distance(x, y):
    return cv2.compareHist(np.array(x, dtype=np.float32), np.array(y, dtype=np.
    ↪float32), cv2.HISTCMP_CHISQR)

def bhattacharyya_distance(x, y):
    return cv2.compareHist(np.array(x, dtype=np.float32), np.array(y, dtype=np.
    ↪float32), cv2.HISTCMP_BHATTACHARYYA)

def intersection_distance(x, y):
    return 1 - cv2.compareHist(np.array(x, dtype=np.float32), np.array(y,
    ↪dtype=np.float32), cv2.HISTCMP_INTERSECT)
```

## 5 Load Best Model

```
knn_model = joblib.load(project_dir + '\\joblib\\best_knn_model.joblib')
# sum_model = joblib.load(project_dir + '\\joblib\\best_sum_model.joblib')

y_pred_knn = knn_model.predict(test_features)
# y_pred_sum = sum_model.predict(test_features)
```

c:\Users\hoang\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\base.py:376: InconsistentVersionWarning: Trying to unpickle estimator KNeighborsClassifier from version 1.6.0 when using version 1.5.2. This might lead to breaking code or invalid results. Use at your own risk. For more info please refer to:  
[https://scikit-learn.org/stable/model\\_persistence.html#security-maintainability-limitations](https://scikit-learn.org/stable/model_persistence.html#security-maintainability-limitations)

```
warnings.warn(
```

```
# print("Tham số của KNN Model:")
# print(knn_model.get_params())

# print("\nTham số của SVM Model:")
# print(sum_model.get_params())
```

## 6 Gridsearch KNN

```
# knn_model = KNeighborsClassifier()
# knn_model.fit(train_features, train_labels_encoded)
# y_pred_knn = knn_model.predict(test_features)
```

```
# param_grid = {
#     'n_neighbors': [3, 4, 5, 6, 7, 10],
#     'weights': ['uniform', 'distance'],
```

```

#         'metric': [
#             cityblock,
#             euclidean,
#             cosine,
#             sqeuclidean,
#             chi_square_distance,
#             bhattacharyya_distance,
#             intersection_distance
#         ]
#     }

# knn_model = KNeighborsClassifier()
# grid_search_knn = GridSearchCV(
#     knn_model,
#     param_grid,
#     cv=3,
#     scoring='f1_macro',
#     verbose=3
# )

# grid_search_knn.fit(train_features, train_labels_encoded)

```

```

# best_knn = grid_search_knn.best_estimator_
# print(f"Best Params: {grid_search_knn.best_params_}")

# print(f"Thuật toán sử dụng: {best_knn.algorithm}")

# y_pred_knn = best_knn.predict(test_features)

# joblib.dump(best_knn, project_dir + '\\joblib\\best_knn_model.joblib')

```

## 7 Gridsearch SVM

```

# svm_model = SVC()
# svm_model.fit(train_features, train_labels_encoded)
# y_pred_svm = svm_model.predict(test_features)

```

```

param_grid = {
    'C': [0.4, 0.45, 0.5, 1.0, 1.0],
    'kernel': ['rbf', 'linear', 'poly', 'sigmoid'],
    'gamma': ['scale', 'auto', 0.1, 0.01, 0.001],
    'degree': [4, 5, 6, 7],
}

svm_model = SVC()

```



```

grid_search_svm = GridSearchCV(
    estimator=svm_model,
    param_grid=param_grid,
    cv=3,
    scoring='f1_macro',
    verbose=3,
)

grid_search_svm.fit(train_features, train_labels_encoded)

```

Fitting 3 folds for each of 400 candidates, totalling 1200 fits

```

[CV 1/3] END C=0.4, degree=4, gamma=scale, kernel=rbf;; score=0.802 total time=
1.0s
[CV 2/3] END C=0.4, degree=4, gamma=scale, kernel=rbf;; score=0.775 total time=
1.3s
[CV 3/3] END C=0.4, degree=4, gamma=scale, kernel=rbf;; score=0.748 total time=
1.2s
[CV 1/3] END C=0.4, degree=4, gamma=scale, kernel=linear;; score=0.845 total
time= 0.5s
[CV 2/3] END C=0.4, degree=4, gamma=scale, kernel=linear;; score=0.857 total
time= 0.4s
[CV 3/3] END C=0.4, degree=4, gamma=scale, kernel=linear;; score=0.820 total
time= 0.5s
[CV 1/3] END C=0.4, degree=4, gamma=scale, kernel=poly;; score=0.914 total time=
1.0s
[CV 2/3] END C=0.4, degree=4, gamma=scale, kernel=poly;; score=0.891 total time=
1.0s
[CV 3/3] END C=0.4, degree=4, gamma=scale, kernel=poly;; score=0.859 total time=
0.7s
[CV 1/3] END C=0.4, degree=4, gamma=scale, kernel=sigmoid;; score=0.641 total
time= 0.6s
[CV 2/3] END C=0.4, degree=4, gamma=scale, kernel=sigmoid;; score=0.674 total
time= 0.6s
[CV 3/3] END C=0.4, degree=4, gamma=scale, kernel=sigmoid;; score=0.630 total
time= 0.7s
[CV 1/3] END C=0.4, degree=4, gamma=auto, kernel=rbf;; score=0.441 total time=
1.5s
[CV 2/3] END C=0.4, degree=4, gamma=auto, kernel=rbf;; score=0.461 total time=
1.6s
[CV 3/3] END C=0.4, degree=4, gamma=auto, kernel=rbf;; score=0.454 total time=
2.0s
[CV 1/3] END C=0.4, degree=4, gamma=auto, kernel=linear;; score=0.845 total
time= 0.5s
[CV 2/3] END C=0.4, degree=4, gamma=auto, kernel=linear;; score=0.857 total
time= 0.4s
[CV 3/3] END C=0.4, degree=4, gamma=auto, kernel=linear;; score=0.820 total
time= 0.4s
[CV 1/3] END C=0.4, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=

```

1.4s  
[CV 2/3] END C=0.4, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=0.4, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=0.4, degree=4, gamma=auto, kernel=sigmoid;; score=0.318 total time= 1.1s  
[CV 2/3] END C=0.4, degree=4, gamma=auto, kernel=sigmoid;; score=0.256 total time= 1.1s  
[CV 3/3] END C=0.4, degree=4, gamma=auto, kernel=sigmoid;; score=0.211 total time= 1.1s  
[CV 1/3] END C=0.4, degree=4, gamma=0.1, kernel=rbf;; score=0.587 total time=1.4s  
[CV 2/3] END C=0.4, degree=4, gamma=0.1, kernel=rbf;; score=0.595 total time=1.4s  
[CV 3/3] END C=0.4, degree=4, gamma=0.1, kernel=rbf;; score=0.602 total time=1.3s  
[CV 1/3] END C=0.4, degree=4, gamma=0.1, kernel=linear;; score=0.845 total time=0.4s  
[CV 2/3] END C=0.4, degree=4, gamma=0.1, kernel=linear;; score=0.857 total time=0.4s  
[CV 3/3] END C=0.4, degree=4, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
[CV 1/3] END C=0.4, degree=4, gamma=0.1, kernel=poly;; score=0.914 total time=0.7s  
[CV 2/3] END C=0.4, degree=4, gamma=0.1, kernel=poly;; score=0.891 total time=0.7s  
[CV 3/3] END C=0.4, degree=4, gamma=0.1, kernel=poly;; score=0.856 total time=0.7s  
[CV 1/3] END C=0.4, degree=4, gamma=0.1, kernel=sigmoid;; score=0.416 total time= 0.9s  
[CV 2/3] END C=0.4, degree=4, gamma=0.1, kernel=sigmoid;; score=0.456 total time= 0.9s  
[CV 3/3] END C=0.4, degree=4, gamma=0.1, kernel=sigmoid;; score=0.473 total time= 0.9s  
[CV 1/3] END C=0.4, degree=4, gamma=0.01, kernel=rbf;; score=0.690 total time=1.0s  
[CV 2/3] END C=0.4, degree=4, gamma=0.01, kernel=rbf;; score=0.726 total time=1.2s  
[CV 3/3] END C=0.4, degree=4, gamma=0.01, kernel=rbf;; score=0.685 total time=1.1s  
[CV 1/3] END C=0.4, degree=4, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.4, degree=4, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=4, gamma=0.01, kernel=linear;; score=0.820 total time= 0.6s  
[CV 1/3] END C=0.4, degree=4, gamma=0.01, kernel=poly;; score=0.417 total time=

1.4s  
[CV 2/3] END C=0.4, degree=4, gamma=0.01, kernel=poly;; score=0.433 total time=1.5s  
1.5s  
[CV 3/3] END C=0.4, degree=4, gamma=0.01, kernel=poly;; score=0.401 total time=1.3s  
[CV 1/3] END C=0.4, degree=4, gamma=0.01, kernel=sigmoid;; score=0.568 total time= 1.0s  
[CV 2/3] END C=0.4, degree=4, gamma=0.01, kernel=sigmoid;; score=0.585 total time= 1.5s  
[CV 3/3] END C=0.4, degree=4, gamma=0.01, kernel=sigmoid;; score=0.585 total time= 1.5s  
[CV 1/3] END C=0.4, degree=4, gamma=0.001, kernel=rbf;; score=0.449 total time=1.9s  
[CV 2/3] END C=0.4, degree=4, gamma=0.001, kernel=rbf;; score=0.469 total time=1.5s  
[CV 3/3] END C=0.4, degree=4, gamma=0.001, kernel=rbf;; score=0.461 total time=1.3s  
[CV 1/3] END C=0.4, degree=4, gamma=0.001, kernel=linear;; score=0.845 total time= 0.6s  
[CV 2/3] END C=0.4, degree=4, gamma=0.001, kernel=linear;; score=0.857 total time= 0.6s  
[CV 3/3] END C=0.4, degree=4, gamma=0.001, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=0.4, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time=1.4s  
[CV 2/3] END C=0.4, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time=1.3s  
[CV 3/3] END C=0.4, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time=1.3s  
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[CV 3/3] END C=0.4, degree=5, gamma=scale, kernel=linear;; score=0.820 total time= 0.7s  
[CV 1/3] END C=0.4, degree=5, gamma=scale, kernel=poly;; score=0.899 total time=

1.4s  
[CV 2/3] END C=0.4, degree=5, gamma=scale, kernel=poly;; score=0.888 total time=1.3s  
[CV 3/3] END C=0.4, degree=5, gamma=scale, kernel=poly;; score=0.852 total time=1.2s  
[CV 1/3] END C=0.4, degree=5, gamma=scale, kernel=sigmoid;; score=0.641 total time= 1.0s  
[CV 2/3] END C=0.4, degree=5, gamma=scale, kernel=sigmoid;; score=0.674 total time= 1.0s  
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[CV 1/3] END C=0.4, degree=5, gamma=auto, kernel=rbf;; score=0.441 total time=2.1s  
[CV 2/3] END C=0.4, degree=5, gamma=auto, kernel=rbf;; score=0.461 total time=1.7s  
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1.0s  
[CV 2/3] END C=0.4, degree=5, gamma=0.1, kernel=poly;; score=0.888 total time=1.1s  
[CV 3/3] END C=0.4, degree=5, gamma=0.1, kernel=poly;; score=0.852 total time=1.0s  
[CV 1/3] END C=0.4, degree=5, gamma=0.1, kernel=sigmoid;; score=0.416 total time= 1.2s  
[CV 2/3] END C=0.4, degree=5, gamma=0.1, kernel=sigmoid;; score=0.456 total time= 1.2s  
[CV 3/3] END C=0.4, degree=5, gamma=0.1, kernel=sigmoid;; score=0.473 total time= 1.0s  
[CV 1/3] END C=0.4, degree=5, gamma=0.01, kernel=rbf;; score=0.690 total time=1.0s  
[CV 2/3] END C=0.4, degree=5, gamma=0.01, kernel=rbf;; score=0.726 total time=1.0s  
[CV 3/3] END C=0.4, degree=5, gamma=0.01, kernel=rbf;; score=0.685 total time=1.2s  
[CV 1/3] END C=0.4, degree=5, gamma=0.01, kernel=linear;; score=0.845 total time= 0.6s  
[CV 2/3] END C=0.4, degree=5, gamma=0.01, kernel=linear;; score=0.857 total time= 0.7s  
[CV 3/3] END C=0.4, degree=5, gamma=0.01, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=0.4, degree=5, gamma=0.01, kernel=poly;; score=0.075 total time=2.0s  
[CV 2/3] END C=0.4, degree=5, gamma=0.01, kernel=poly;; score=0.075 total time=1.8s  
[CV 3/3] END C=0.4, degree=5, gamma=0.01, kernel=poly;; score=0.075 total time=2.2s  
[CV 1/3] END C=0.4, degree=5, gamma=0.01, kernel=sigmoid;; score=0.568 total time= 1.2s  
[CV 2/3] END C=0.4, degree=5, gamma=0.01, kernel=sigmoid;; score=0.585 total time= 1.0s  
[CV 3/3] END C=0.4, degree=5, gamma=0.01, kernel=sigmoid;; score=0.585 total time= 0.7s  
[CV 1/3] END C=0.4, degree=5, gamma=0.001, kernel=rbf;; score=0.449 total time=1.3s  
[CV 2/3] END C=0.4, degree=5, gamma=0.001, kernel=rbf;; score=0.469 total time=1.5s  
[CV 3/3] END C=0.4, degree=5, gamma=0.001, kernel=rbf;; score=0.461 total time=1.4s  
[CV 1/3] END C=0.4, degree=5, gamma=0.001, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.4, degree=5, gamma=0.001, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=5, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.4, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=

1.1s  
[CV 2/3] END C=0.4, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=1.2s  
[CV 3/3] END C=0.4, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=1.2s  
[CV 1/3] END C=0.4, degree=5, gamma=0.001, kernel=sigmoid;; score=0.441 total time= 1.2s  
[CV 2/3] END C=0.4, degree=5, gamma=0.001, kernel=sigmoid;; score=0.461 total time= 1.2s  
[CV 3/3] END C=0.4, degree=5, gamma=0.001, kernel=sigmoid;; score=0.453 total time= 1.5s  
[CV 1/3] END C=0.4, degree=6, gamma=scale, kernel=rbf;; score=0.802 total time=1.3s  
[CV 2/3] END C=0.4, degree=6, gamma=scale, kernel=rbf;; score=0.775 total time=1.2s  
[CV 3/3] END C=0.4, degree=6, gamma=scale, kernel=rbf;; score=0.748 total time=1.0s  
[CV 1/3] END C=0.4, degree=6, gamma=scale, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.4, degree=6, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=6, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.4, degree=6, gamma=scale, kernel=poly;; score=0.882 total time=1.1s  
[CV 2/3] END C=0.4, degree=6, gamma=scale, kernel=poly;; score=0.873 total time=1.2s  
[CV 3/3] END C=0.4, degree=6, gamma=scale, kernel=poly;; score=0.854 total time=1.1s  
[CV 1/3] END C=0.4, degree=6, gamma=scale, kernel=sigmoid;; score=0.641 total time= 0.7s  
[CV 2/3] END C=0.4, degree=6, gamma=scale, kernel=sigmoid;; score=0.674 total time= 0.6s  
[CV 3/3] END C=0.4, degree=6, gamma=scale, kernel=sigmoid;; score=0.630 total time= 0.7s  
[CV 1/3] END C=0.4, degree=6, gamma=auto, kernel=rbf;; score=0.441 total time=1.5s  
[CV 2/3] END C=0.4, degree=6, gamma=auto, kernel=rbf;; score=0.461 total time=1.3s  
[CV 3/3] END C=0.4, degree=6, gamma=auto, kernel=rbf;; score=0.454 total time=1.2s  
[CV 1/3] END C=0.4, degree=6, gamma=auto, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.4, degree=6, gamma=auto, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=6, gamma=auto, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.4, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=

1.2s  
[CV 2/3] END C=0.4, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=1.0s  
[CV 3/3] END C=0.4, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=0.4, degree=6, gamma=auto, kernel=sigmoid;; score=0.318 total time= 1.0s  
[CV 2/3] END C=0.4, degree=6, gamma=auto, kernel=sigmoid;; score=0.256 total time= 1.0s  
[CV 3/3] END C=0.4, degree=6, gamma=auto, kernel=sigmoid;; score=0.211 total time= 1.2s  
[CV 1/3] END C=0.4, degree=6, gamma=0.1, kernel=rbf;; score=0.587 total time=1.2s  
[CV 2/3] END C=0.4, degree=6, gamma=0.1, kernel=rbf;; score=0.595 total time=1.2s  
[CV 3/3] END C=0.4, degree=6, gamma=0.1, kernel=rbf;; score=0.602 total time=1.2s  
[CV 1/3] END C=0.4, degree=6, gamma=0.1, kernel=linear;; score=0.845 total time=0.4s  
[CV 2/3] END C=0.4, degree=6, gamma=0.1, kernel=linear;; score=0.857 total time=0.5s  
[CV 3/3] END C=0.4, degree=6, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
[CV 1/3] END C=0.4, degree=6, gamma=0.1, kernel=poly;; score=0.882 total time=0.9s  
[CV 2/3] END C=0.4, degree=6, gamma=0.1, kernel=poly;; score=0.873 total time=0.8s  
[CV 3/3] END C=0.4, degree=6, gamma=0.1, kernel=poly;; score=0.854 total time=0.9s  
[CV 1/3] END C=0.4, degree=6, gamma=0.1, kernel=sigmoid;; score=0.416 total time= 0.8s  
[CV 2/3] END C=0.4, degree=6, gamma=0.1, kernel=sigmoid;; score=0.456 total time= 0.9s  
[CV 3/3] END C=0.4, degree=6, gamma=0.1, kernel=sigmoid;; score=0.473 total time= 1.0s  
[CV 1/3] END C=0.4, degree=6, gamma=0.01, kernel=rbf;; score=0.690 total time=0.8s  
[CV 2/3] END C=0.4, degree=6, gamma=0.01, kernel=rbf;; score=0.726 total time=0.8s  
[CV 3/3] END C=0.4, degree=6, gamma=0.01, kernel=rbf;; score=0.685 total time=0.8s  
[CV 1/3] END C=0.4, degree=6, gamma=0.01, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.4, degree=6, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=6, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.4, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=

1.1s  
[CV 2/3] END C=0.4, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=0.4, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=1.2s  
[CV 1/3] END C=0.4, degree=6, gamma=0.01, kernel=sigmoid;; score=0.568 total time= 0.7s  
[CV 2/3] END C=0.4, degree=6, gamma=0.01, kernel=sigmoid;; score=0.585 total time= 0.9s  
[CV 3/3] END C=0.4, degree=6, gamma=0.01, kernel=sigmoid;; score=0.585 total time= 0.8s  
[CV 1/3] END C=0.4, degree=6, gamma=0.001, kernel=rbf;; score=0.449 total time=1.3s  
[CV 2/3] END C=0.4, degree=6, gamma=0.001, kernel=rbf;; score=0.469 total time=1.3s  
[CV 3/3] END C=0.4, degree=6, gamma=0.001, kernel=rbf;; score=0.461 total time=1.2s  
[CV 1/3] END C=0.4, degree=6, gamma=0.001, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.4, degree=6, gamma=0.001, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=6, gamma=0.001, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=0.4, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time=1.0s  
[CV 2/3] END C=0.4, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time=1.2s  
[CV 3/3] END C=0.4, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=0.4, degree=6, gamma=0.001, kernel=sigmoid;; score=0.441 total time= 1.2s  
[CV 2/3] END C=0.4, degree=6, gamma=0.001, kernel=sigmoid;; score=0.461 total time= 1.1s  
[CV 3/3] END C=0.4, degree=6, gamma=0.001, kernel=sigmoid;; score=0.453 total time= 1.1s  
[CV 1/3] END C=0.4, degree=7, gamma=scale, kernel=rbf;; score=0.802 total time=0.9s  
[CV 2/3] END C=0.4, degree=7, gamma=scale, kernel=rbf;; score=0.775 total time=1.0s  
[CV 3/3] END C=0.4, degree=7, gamma=scale, kernel=rbf;; score=0.748 total time=0.9s  
[CV 1/3] END C=0.4, degree=7, gamma=scale, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.4, degree=7, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=7, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.4, degree=7, gamma=scale, kernel=poly;; score=0.870 total time=



1.0s  
[CV 2/3] END C=0.4, degree=7, gamma=scale, kernel=poly;; score=0.858 total time=1.0s  
[CV 3/3] END C=0.4, degree=7, gamma=scale, kernel=poly;; score=0.852 total time=1.1s  
[CV 1/3] END C=0.4, degree=7, gamma=scale, kernel=sigmoid;; score=0.641 total time= 0.6s  
[CV 2/3] END C=0.4, degree=7, gamma=scale, kernel=sigmoid;; score=0.674 total time= 0.6s  
[CV 3/3] END C=0.4, degree=7, gamma=scale, kernel=sigmoid;; score=0.630 total time= 0.6s  
[CV 1/3] END C=0.4, degree=7, gamma=auto, kernel=rbf;; score=0.441 total time=1.4s  
[CV 2/3] END C=0.4, degree=7, gamma=auto, kernel=rbf;; score=0.461 total time=1.8s  
[CV 3/3] END C=0.4, degree=7, gamma=auto, kernel=rbf;; score=0.454 total time=1.6s  
[CV 1/3] END C=0.4, degree=7, gamma=auto, kernel=linear;; score=0.845 total time= 0.6s  
[CV 2/3] END C=0.4, degree=7, gamma=auto, kernel=linear;; score=0.857 total time= 0.7s  
[CV 3/3] END C=0.4, degree=7, gamma=auto, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=0.4, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.2s  
[CV 2/3] END C=0.4, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=0.4, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=0.4, degree=7, gamma=auto, kernel=sigmoid;; score=0.318 total time= 1.1s  
[CV 2/3] END C=0.4, degree=7, gamma=auto, kernel=sigmoid;; score=0.256 total time= 1.2s  
[CV 3/3] END C=0.4, degree=7, gamma=auto, kernel=sigmoid;; score=0.211 total time= 1.5s  
[CV 1/3] END C=0.4, degree=7, gamma=0.1, kernel=rbf;; score=0.587 total time=1.5s  
[CV 2/3] END C=0.4, degree=7, gamma=0.1, kernel=rbf;; score=0.595 total time=1.5s  
[CV 3/3] END C=0.4, degree=7, gamma=0.1, kernel=rbf;; score=0.602 total time=1.8s  
[CV 1/3] END C=0.4, degree=7, gamma=0.1, kernel=linear;; score=0.845 total time=0.7s  
[CV 2/3] END C=0.4, degree=7, gamma=0.1, kernel=linear;; score=0.857 total time=0.5s  
[CV 3/3] END C=0.4, degree=7, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
[CV 1/3] END C=0.4, degree=7, gamma=0.1, kernel=poly;; score=0.870 total time=

1.0s  
[CV 2/3] END C=0.4, degree=7, gamma=0.1, kernel=poly;; score=0.858 total time=1.0s  
[CV 3/3] END C=0.4, degree=7, gamma=0.1, kernel=poly;; score=0.852 total time=1.0s  
[CV 1/3] END C=0.4, degree=7, gamma=0.1, kernel=sigmoid;; score=0.416 total time= 1.0s  
[CV 2/3] END C=0.4, degree=7, gamma=0.1, kernel=sigmoid;; score=0.456 total time= 1.4s  
[CV 3/3] END C=0.4, degree=7, gamma=0.1, kernel=sigmoid;; score=0.473 total time= 1.2s  
[CV 1/3] END C=0.4, degree=7, gamma=0.01, kernel=rbf;; score=0.690 total time=1.1s  
[CV 2/3] END C=0.4, degree=7, gamma=0.01, kernel=rbf;; score=0.726 total time=1.0s  
[CV 3/3] END C=0.4, degree=7, gamma=0.01, kernel=rbf;; score=0.685 total time=1.0s  
[CV 1/3] END C=0.4, degree=7, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.4, degree=7, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=7, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.4, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.2s  
[CV 2/3] END C=0.4, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.3s  
[CV 3/3] END C=0.4, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.6s  
[CV 1/3] END C=0.4, degree=7, gamma=0.01, kernel=sigmoid;; score=0.568 total time= 0.8s  
[CV 2/3] END C=0.4, degree=7, gamma=0.01, kernel=sigmoid;; score=0.585 total time= 0.8s  
[CV 3/3] END C=0.4, degree=7, gamma=0.01, kernel=sigmoid;; score=0.585 total time= 1.0s  
[CV 1/3] END C=0.4, degree=7, gamma=0.001, kernel=rbf;; score=0.449 total time=1.9s  
[CV 2/3] END C=0.4, degree=7, gamma=0.001, kernel=rbf;; score=0.469 total time=2.0s  
[CV 3/3] END C=0.4, degree=7, gamma=0.001, kernel=rbf;; score=0.461 total time=1.3s  
[CV 1/3] END C=0.4, degree=7, gamma=0.001, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.4, degree=7, gamma=0.001, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.4, degree=7, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.4, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=

1.3s  
[CV 2/3] END C=0.4, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=1.3s  
[CV 3/3] END C=0.4, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=1.2s  
[CV 1/3] END C=0.4, degree=7, gamma=0.001, kernel=sigmoid;; score=0.441 total time= 1.2s  
[CV 2/3] END C=0.4, degree=7, gamma=0.001, kernel=sigmoid;; score=0.461 total time= 1.1s  
[CV 3/3] END C=0.4, degree=7, gamma=0.001, kernel=sigmoid;; score=0.453 total time= 1.1s  
[CV 1/3] END C=0.45, degree=4, gamma=scale, kernel=rbf;; score=0.806 total time=0.9s  
[CV 2/3] END C=0.45, degree=4, gamma=scale, kernel=rbf;; score=0.790 total time=1.0s  
[CV 3/3] END C=0.45, degree=4, gamma=scale, kernel=rbf;; score=0.767 total time=0.9s  
[CV 1/3] END C=0.45, degree=4, gamma=scale, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.45, degree=4, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=4, gamma=scale, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=0.45, degree=4, gamma=scale, kernel=poly;; score=0.914 total time= 0.9s  
[CV 2/3] END C=0.45, degree=4, gamma=scale, kernel=poly;; score=0.891 total time= 0.8s  
[CV 3/3] END C=0.45, degree=4, gamma=scale, kernel=poly;; score=0.861 total time= 0.8s  
[CV 1/3] END C=0.45, degree=4, gamma=scale, kernel=sigmoid;; score=0.653 total time= 0.7s  
[CV 2/3] END C=0.45, degree=4, gamma=scale, kernel=sigmoid;; score=0.689 total time= 0.7s  
[CV 3/3] END C=0.45, degree=4, gamma=scale, kernel=sigmoid;; score=0.656 total time= 0.7s  
[CV 1/3] END C=0.45, degree=4, gamma=auto, kernel=rbf;; score=0.443 total time=1.5s  
[CV 2/3] END C=0.45, degree=4, gamma=auto, kernel=rbf;; score=0.463 total time=1.6s  
[CV 3/3] END C=0.45, degree=4, gamma=auto, kernel=rbf;; score=0.456 total time=1.7s  
[CV 1/3] END C=0.45, degree=4, gamma=auto, kernel=linear;; score=0.845 total time= 0.6s  
[CV 2/3] END C=0.45, degree=4, gamma=auto, kernel=linear;; score=0.857 total time= 0.6s  
[CV 3/3] END C=0.45, degree=4, gamma=auto, kernel=linear;; score=0.820 total time= 0.7s  
[CV 1/3] END C=0.45, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=

1.4s  
[CV 2/3] END C=0.45, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=1.5s  
[CV 3/3] END C=0.45, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=2.1s  
[CV 1/3] END C=0.45, degree=4, gamma=auto, kernel=sigmoid;; score=0.379 total time= 1.9s  
[CV 2/3] END C=0.45, degree=4, gamma=auto, kernel=sigmoid;; score=0.342 total time= 1.4s  
[CV 3/3] END C=0.45, degree=4, gamma=auto, kernel=sigmoid;; score=0.313 total time= 1.1s  
[CV 1/3] END C=0.45, degree=4, gamma=0.1, kernel=rbf;; score=0.632 total time=1.3s  
[CV 2/3] END C=0.45, degree=4, gamma=0.1, kernel=rbf;; score=0.620 total time=1.4s  
[CV 3/3] END C=0.45, degree=4, gamma=0.1, kernel=rbf;; score=0.632 total time=1.3s  
[CV 1/3] END C=0.45, degree=4, gamma=0.1, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.45, degree=4, gamma=0.1, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=4, gamma=0.1, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=4, gamma=0.1, kernel=poly;; score=0.914 total time=0.7s  
[CV 2/3] END C=0.45, degree=4, gamma=0.1, kernel=poly;; score=0.891 total time=0.7s  
[CV 3/3] END C=0.45, degree=4, gamma=0.1, kernel=poly;; score=0.856 total time=0.7s  
[CV 1/3] END C=0.45, degree=4, gamma=0.1, kernel=sigmoid;; score=0.420 total time= 0.8s  
[CV 2/3] END C=0.45, degree=4, gamma=0.1, kernel=sigmoid;; score=0.457 total time= 0.9s  
[CV 3/3] END C=0.45, degree=4, gamma=0.1, kernel=sigmoid;; score=0.472 total time= 0.9s  
[CV 1/3] END C=0.45, degree=4, gamma=0.01, kernel=rbf;; score=0.703 total time=0.8s  
[CV 2/3] END C=0.45, degree=4, gamma=0.01, kernel=rbf;; score=0.744 total time=1.0s  
[CV 3/3] END C=0.45, degree=4, gamma=0.01, kernel=rbf;; score=0.702 total time=1.1s  
[CV 1/3] END C=0.45, degree=4, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.45, degree=4, gamma=0.01, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=0.45, degree=4, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=4, gamma=0.01, kernel=poly;; score=0.423 total time=

1.2s  
[CV 2/3] END C=0.45, degree=4, gamma=0.01, kernel=poly;; score=0.448 total time=1.1s  
[CV 3/3] END C=0.45, degree=4, gamma=0.01, kernel=poly;; score=0.401 total time=1.1s  
[CV 1/3] END C=0.45, degree=4, gamma=0.01, kernel=sigmoid;; score=0.603 total time= 0.6s  
[CV 2/3] END C=0.45, degree=4, gamma=0.01, kernel=sigmoid;; score=0.605 total time= 0.8s  
[CV 3/3] END C=0.45, degree=4, gamma=0.01, kernel=sigmoid;; score=0.618 total time= 0.7s  
[CV 1/3] END C=0.45, degree=4, gamma=0.001, kernel=rbf;; score=0.449 total time=1.2s  
[CV 2/3] END C=0.45, degree=4, gamma=0.001, kernel=rbf;; score=0.476 total time=1.3s  
[CV 3/3] END C=0.45, degree=4, gamma=0.001, kernel=rbf;; score=0.460 total time=1.3s  
[CV 1/3] END C=0.45, degree=4, gamma=0.001, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.45, degree=4, gamma=0.001, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=4, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time= 1.1s  
[CV 2/3] END C=0.45, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time= 1.2s  
[CV 3/3] END C=0.45, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time= 1.3s  
[CV 1/3] END C=0.45, degree=4, gamma=0.001, kernel=sigmoid;; score=0.441 total time= 1.4s  
[CV 2/3] END C=0.45, degree=4, gamma=0.001, kernel=sigmoid;; score=0.463 total time= 1.2s  
[CV 3/3] END C=0.45, degree=4, gamma=0.001, kernel=sigmoid;; score=0.454 total time= 1.0s  
[CV 1/3] END C=0.45, degree=5, gamma=scale, kernel=rbf;; score=0.806 total time=0.9s  
[CV 2/3] END C=0.45, degree=5, gamma=scale, kernel=rbf;; score=0.790 total time=0.9s  
[CV 3/3] END C=0.45, degree=5, gamma=scale, kernel=rbf;; score=0.767 total time=0.9s  
[CV 1/3] END C=0.45, degree=5, gamma=scale, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.45, degree=5, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=5, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=5, gamma=scale, kernel=poly;; score=0.899 total

```

time= 0.9s
[CV 2/3] END C=0.45, degree=5, gamma=scale, kernel=poly;; score=0.888 total
time= 0.9s
[CV 3/3] END C=0.45, degree=5, gamma=scale, kernel=poly;; score=0.852 total
time= 0.8s
[CV 1/3] END C=0.45, degree=5, gamma=scale, kernel=sigmoid;; score=0.653 total
time= 0.6s
[CV 2/3] END C=0.45, degree=5, gamma=scale, kernel=sigmoid;; score=0.689 total
time= 0.6s
[CV 3/3] END C=0.45, degree=5, gamma=scale, kernel=sigmoid;; score=0.656 total
time= 0.6s
[CV 1/3] END C=0.45, degree=5, gamma=auto, kernel=rbf;; score=0.443 total time=
1.3s
[CV 2/3] END C=0.45, degree=5, gamma=auto, kernel=rbf;; score=0.463 total time=
1.3s
[CV 3/3] END C=0.45, degree=5, gamma=auto, kernel=rbf;; score=0.456 total time=
1.4s
[CV 1/3] END C=0.45, degree=5, gamma=auto, kernel=linear;; score=0.845 total
time= 0.6s
[CV 2/3] END C=0.45, degree=5, gamma=auto, kernel=linear;; score=0.857 total
time= 0.5s
[CV 3/3] END C=0.45, degree=5, gamma=auto, kernel=linear;; score=0.820 total
time= 0.5s
[CV 1/3] END C=0.45, degree=5, gamma=auto, kernel=poly;; score=0.075 total time=
1.1s
[CV 2/3] END C=0.45, degree=5, gamma=auto, kernel=poly;; score=0.075 total time=
1.2s
[CV 3/3] END C=0.45, degree=5, gamma=auto, kernel=poly;; score=0.075 total time=
1.2s
[CV 1/3] END C=0.45, degree=5, gamma=auto, kernel=sigmoid;; score=0.379 total
time= 1.1s
[CV 2/3] END C=0.45, degree=5, gamma=auto, kernel=sigmoid;; score=0.342 total
time= 1.1s
[CV 3/3] END C=0.45, degree=5, gamma=auto, kernel=sigmoid;; score=0.313 total
time= 1.1s
[CV 1/3] END C=0.45, degree=5, gamma=0.1, kernel=rbf;; score=0.632 total time=
1.3s
[CV 2/3] END C=0.45, degree=5, gamma=0.1, kernel=rbf;; score=0.620 total time=
1.3s
[CV 3/3] END C=0.45, degree=5, gamma=0.1, kernel=rbf;; score=0.632 total time=
1.2s
[CV 1/3] END C=0.45, degree=5, gamma=0.1, kernel=linear;; score=0.845 total
time= 0.4s
[CV 2/3] END C=0.45, degree=5, gamma=0.1, kernel=linear;; score=0.857 total
time= 0.4s
[CV 3/3] END C=0.45, degree=5, gamma=0.1, kernel=linear;; score=0.820 total
time= 0.4s
[CV 1/3] END C=0.45, degree=5, gamma=0.1, kernel=poly;; score=0.899 total time=

```

0.8s  
[CV 2/3] END C=0.45, degree=5, gamma=0.1, kernel=poly;; score=0.888 total time=0.9s  
0.9s  
[CV 3/3] END C=0.45, degree=5, gamma=0.1, kernel=poly;; score=0.852 total time=0.8s  
0.8s  
[CV 1/3] END C=0.45, degree=5, gamma=0.1, kernel=sigmoid;; score=0.420 total time= 0.9s  
[CV 2/3] END C=0.45, degree=5, gamma=0.1, kernel=sigmoid;; score=0.457 total time= 0.9s  
[CV 3/3] END C=0.45, degree=5, gamma=0.1, kernel=sigmoid;; score=0.472 total time= 0.9s  
[CV 1/3] END C=0.45, degree=5, gamma=0.01, kernel=rbf;; score=0.703 total time=0.8s  
[CV 2/3] END C=0.45, degree=5, gamma=0.01, kernel=rbf;; score=0.744 total time=0.8s  
[CV 3/3] END C=0.45, degree=5, gamma=0.01, kernel=rbf;; score=0.702 total time=0.8s  
[CV 1/3] END C=0.45, degree=5, gamma=0.01, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.45, degree=5, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=5, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=5, gamma=0.01, kernel=poly;; score=0.075 total time=1.0s  
[CV 2/3] END C=0.45, degree=5, gamma=0.01, kernel=poly;; score=0.075 total time=1.0s  
[CV 3/3] END C=0.45, degree=5, gamma=0.01, kernel=poly;; score=0.075 total time=1.0s  
[CV 1/3] END C=0.45, degree=5, gamma=0.01, kernel=sigmoid;; score=0.603 total time= 0.6s  
[CV 2/3] END C=0.45, degree=5, gamma=0.01, kernel=sigmoid;; score=0.605 total time= 0.7s  
[CV 3/3] END C=0.45, degree=5, gamma=0.01, kernel=sigmoid;; score=0.618 total time= 0.6s  
[CV 1/3] END C=0.45, degree=5, gamma=0.001, kernel=rbf;; score=0.449 total time=1.1s  
[CV 2/3] END C=0.45, degree=5, gamma=0.001, kernel=rbf;; score=0.476 total time=1.2s  
[CV 3/3] END C=0.45, degree=5, gamma=0.001, kernel=rbf;; score=0.460 total time=1.2s  
[CV 1/3] END C=0.45, degree=5, gamma=0.001, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.45, degree=5, gamma=0.001, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=5, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=5, gamma=0.001, kernel=poly;; score=0.075 total

```

time= 1.0s
[CV 2/3] END C=0.45, degree=5, gamma=0.001, kernel=poly;; score=0.075 total
time= 1.0s
[CV 3/3] END C=0.45, degree=5, gamma=0.001, kernel=poly;; score=0.075 total
time= 1.0s
[CV 1/3] END C=0.45, degree=5, gamma=0.001, kernel=sigmoid;; score=0.441 total
time= 1.1s
[CV 2/3] END C=0.45, degree=5, gamma=0.001, kernel=sigmoid;; score=0.463 total
time= 1.0s
[CV 3/3] END C=0.45, degree=5, gamma=0.001, kernel=sigmoid;; score=0.454 total
time= 1.1s
[CV 1/3] END C=0.45, degree=6, gamma=scale, kernel=rbf;; score=0.806 total time=
0.9s
[CV 2/3] END C=0.45, degree=6, gamma=scale, kernel=rbf;; score=0.790 total time=
0.9s
[CV 3/3] END C=0.45, degree=6, gamma=scale, kernel=rbf;; score=0.767 total time=
0.9s
[CV 1/3] END C=0.45, degree=6, gamma=scale, kernel=linear;; score=0.845 total
time= 0.4s
[CV 2/3] END C=0.45, degree=6, gamma=scale, kernel=linear;; score=0.857 total
time= 0.4s
[CV 3/3] END C=0.45, degree=6, gamma=scale, kernel=linear;; score=0.820 total
time= 0.4s
[CV 1/3] END C=0.45, degree=6, gamma=scale, kernel=poly;; score=0.882 total
time= 1.0s
[CV 2/3] END C=0.45, degree=6, gamma=scale, kernel=poly;; score=0.873 total
time= 1.1s
[CV 3/3] END C=0.45, degree=6, gamma=scale, kernel=poly;; score=0.854 total
time= 1.1s
[CV 1/3] END C=0.45, degree=6, gamma=scale, kernel=sigmoid;; score=0.653 total
time= 0.6s
[CV 2/3] END C=0.45, degree=6, gamma=scale, kernel=sigmoid;; score=0.689 total
time= 0.6s
[CV 3/3] END C=0.45, degree=6, gamma=scale, kernel=sigmoid;; score=0.656 total
time= 0.6s
[CV 1/3] END C=0.45, degree=6, gamma=auto, kernel=rbf;; score=0.443 total time=
1.3s
[CV 2/3] END C=0.45, degree=6, gamma=auto, kernel=rbf;; score=0.463 total time=
1.3s
[CV 3/3] END C=0.45, degree=6, gamma=auto, kernel=rbf;; score=0.456 total time=
1.3s
[CV 1/3] END C=0.45, degree=6, gamma=auto, kernel=linear;; score=0.845 total
time= 0.4s
[CV 2/3] END C=0.45, degree=6, gamma=auto, kernel=linear;; score=0.857 total
time= 0.4s
[CV 3/3] END C=0.45, degree=6, gamma=auto, kernel=linear;; score=0.820 total
time= 0.4s
[CV 1/3] END C=0.45, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=

```



1.1s  
[CV 2/3] END C=0.45, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=1.2s  
[CV 3/3] END C=0.45, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=0.45, degree=6, gamma=auto, kernel=sigmoid;; score=0.379 total time= 1.0s  
[CV 2/3] END C=0.45, degree=6, gamma=auto, kernel=sigmoid;; score=0.342 total time= 1.1s  
[CV 3/3] END C=0.45, degree=6, gamma=auto, kernel=sigmoid;; score=0.313 total time= 1.1s  
[CV 1/3] END C=0.45, degree=6, gamma=0.1, kernel=rbf;; score=0.632 total time=1.4s  
[CV 2/3] END C=0.45, degree=6, gamma=0.1, kernel=rbf;; score=0.620 total time=1.6s  
[CV 3/3] END C=0.45, degree=6, gamma=0.1, kernel=rbf;; score=0.632 total time=1.4s  
[CV 1/3] END C=0.45, degree=6, gamma=0.1, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.45, degree=6, gamma=0.1, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=6, gamma=0.1, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=6, gamma=0.1, kernel=poly;; score=0.882 total time=0.9s  
[CV 2/3] END C=0.45, degree=6, gamma=0.1, kernel=poly;; score=0.873 total time=0.9s  
[CV 3/3] END C=0.45, degree=6, gamma=0.1, kernel=poly;; score=0.854 total time=1.0s  
[CV 1/3] END C=0.45, degree=6, gamma=0.1, kernel=sigmoid;; score=0.420 total time= 0.9s  
[CV 2/3] END C=0.45, degree=6, gamma=0.1, kernel=sigmoid;; score=0.457 total time= 1.1s  
[CV 3/3] END C=0.45, degree=6, gamma=0.1, kernel=sigmoid;; score=0.472 total time= 0.8s  
[CV 1/3] END C=0.45, degree=6, gamma=0.01, kernel=rbf;; score=0.703 total time=0.9s  
[CV 2/3] END C=0.45, degree=6, gamma=0.01, kernel=rbf;; score=0.744 total time=1.0s  
[CV 3/3] END C=0.45, degree=6, gamma=0.01, kernel=rbf;; score=0.702 total time=1.0s  
[CV 1/3] END C=0.45, degree=6, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.45, degree=6, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=6, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=

1.0s  
[CV 2/3] END C=0.45, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=1.2s  
[CV 3/3] END C=0.45, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=0.45, degree=6, gamma=0.01, kernel=sigmoid;; score=0.603 total time= 0.6s  
[CV 2/3] END C=0.45, degree=6, gamma=0.01, kernel=sigmoid;; score=0.605 total time= 0.7s  
[CV 3/3] END C=0.45, degree=6, gamma=0.01, kernel=sigmoid;; score=0.618 total time= 0.6s  
[CV 1/3] END C=0.45, degree=6, gamma=0.001, kernel=rbf;; score=0.449 total time=1.2s  
[CV 2/3] END C=0.45, degree=6, gamma=0.001, kernel=rbf;; score=0.476 total time=1.2s  
[CV 3/3] END C=0.45, degree=6, gamma=0.001, kernel=rbf;; score=0.460 total time=1.2s  
[CV 1/3] END C=0.45, degree=6, gamma=0.001, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.45, degree=6, gamma=0.001, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=0.45, degree=6, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time= 1.1s  
[CV 2/3] END C=0.45, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time= 1.0s  
[CV 3/3] END C=0.45, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time= 1.0s  
[CV 1/3] END C=0.45, degree=6, gamma=0.001, kernel=sigmoid;; score=0.441 total time= 1.1s  
[CV 2/3] END C=0.45, degree=6, gamma=0.001, kernel=sigmoid;; score=0.463 total time= 1.0s  
[CV 3/3] END C=0.45, degree=6, gamma=0.001, kernel=sigmoid;; score=0.454 total time= 1.0s  
[CV 1/3] END C=0.45, degree=7, gamma=scale, kernel=rbf;; score=0.806 total time=0.8s  
[CV 2/3] END C=0.45, degree=7, gamma=scale, kernel=rbf;; score=0.790 total time=0.9s  
[CV 3/3] END C=0.45, degree=7, gamma=scale, kernel=rbf;; score=0.767 total time=0.9s  
[CV 1/3] END C=0.45, degree=7, gamma=scale, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.45, degree=7, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=7, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=7, gamma=scale, kernel=poly;; score=0.870 total

```

time= 0.9s
[CV 2/3] END C=0.45, degree=7, gamma=scale, kernel=poly;; score=0.858 total
time= 1.0s
[CV 3/3] END C=0.45, degree=7, gamma=scale, kernel=poly;; score=0.852 total
time= 0.9s
[CV 1/3] END C=0.45, degree=7, gamma=scale, kernel=sigmoid;; score=0.653 total
time= 0.6s
[CV 2/3] END C=0.45, degree=7, gamma=scale, kernel=sigmoid;; score=0.689 total
time= 0.6s
[CV 3/3] END C=0.45, degree=7, gamma=scale, kernel=sigmoid;; score=0.656 total
time= 0.6s
[CV 1/3] END C=0.45, degree=7, gamma=auto, kernel=rbf;; score=0.443 total time=
1.4s
[CV 2/3] END C=0.45, degree=7, gamma=auto, kernel=rbf;; score=0.463 total time=
1.5s
[CV 3/3] END C=0.45, degree=7, gamma=auto, kernel=rbf;; score=0.456 total time=
1.5s
[CV 1/3] END C=0.45, degree=7, gamma=auto, kernel=linear;; score=0.845 total
time= 0.5s
[CV 2/3] END C=0.45, degree=7, gamma=auto, kernel=linear;; score=0.857 total
time= 0.4s
[CV 3/3] END C=0.45, degree=7, gamma=auto, kernel=linear;; score=0.820 total
time= 0.4s
[CV 1/3] END C=0.45, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=
1.1s
[CV 2/3] END C=0.45, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=
1.2s
[CV 3/3] END C=0.45, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=
1.0s
[CV 1/3] END C=0.45, degree=7, gamma=auto, kernel=sigmoid;; score=0.379 total
time= 1.1s
[CV 2/3] END C=0.45, degree=7, gamma=auto, kernel=sigmoid;; score=0.342 total
time= 1.1s
[CV 3/3] END C=0.45, degree=7, gamma=auto, kernel=sigmoid;; score=0.313 total
time= 1.1s
[CV 1/3] END C=0.45, degree=7, gamma=0.1, kernel=rbf;; score=0.632 total time=
1.3s
[CV 2/3] END C=0.45, degree=7, gamma=0.1, kernel=rbf;; score=0.620 total time=
1.3s
[CV 3/3] END C=0.45, degree=7, gamma=0.1, kernel=rbf;; score=0.632 total time=
1.3s
[CV 1/3] END C=0.45, degree=7, gamma=0.1, kernel=linear;; score=0.845 total
time= 0.5s
[CV 2/3] END C=0.45, degree=7, gamma=0.1, kernel=linear;; score=0.857 total
time= 0.5s
[CV 3/3] END C=0.45, degree=7, gamma=0.1, kernel=linear;; score=0.820 total
time= 0.4s
[CV 1/3] END C=0.45, degree=7, gamma=0.1, kernel=poly;; score=0.870 total time=

```

0.9s  
[CV 2/3] END C=0.45, degree=7, gamma=0.1, kernel=poly;; score=0.858 total time=1.0s  
[CV 3/3] END C=0.45, degree=7, gamma=0.1, kernel=poly;; score=0.852 total time=1.2s  
[CV 1/3] END C=0.45, degree=7, gamma=0.1, kernel=sigmoid;; score=0.420 total time= 0.9s  
[CV 2/3] END C=0.45, degree=7, gamma=0.1, kernel=sigmoid;; score=0.457 total time= 1.0s  
[CV 3/3] END C=0.45, degree=7, gamma=0.1, kernel=sigmoid;; score=0.472 total time= 1.0s  
[CV 1/3] END C=0.45, degree=7, gamma=0.01, kernel=rbf;; score=0.703 total time=0.8s  
[CV 2/3] END C=0.45, degree=7, gamma=0.01, kernel=rbf;; score=0.744 total time=0.8s  
[CV 3/3] END C=0.45, degree=7, gamma=0.01, kernel=rbf;; score=0.702 total time=0.8s  
[CV 1/3] END C=0.45, degree=7, gamma=0.01, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.45, degree=7, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=7, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.0s  
[CV 2/3] END C=0.45, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=0.45, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=0.45, degree=7, gamma=0.01, kernel=sigmoid;; score=0.603 total time= 0.6s  
[CV 2/3] END C=0.45, degree=7, gamma=0.01, kernel=sigmoid;; score=0.605 total time= 0.6s  
[CV 3/3] END C=0.45, degree=7, gamma=0.01, kernel=sigmoid;; score=0.618 total time= 0.6s  
[CV 1/3] END C=0.45, degree=7, gamma=0.001, kernel=rbf;; score=0.449 total time=1.1s  
[CV 2/3] END C=0.45, degree=7, gamma=0.001, kernel=rbf;; score=0.476 total time=1.2s  
[CV 3/3] END C=0.45, degree=7, gamma=0.001, kernel=rbf;; score=0.460 total time=1.1s  
[CV 1/3] END C=0.45, degree=7, gamma=0.001, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=0.45, degree=7, gamma=0.001, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.45, degree=7, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.45, degree=7, gamma=0.001, kernel=poly;; score=0.075 total

```

time= 1.2s
[CV 2/3] END C=0.45, degree=7, gamma=0.001, kernel=poly;; score=0.075 total
time= 1.1s
[CV 3/3] END C=0.45, degree=7, gamma=0.001, kernel=poly;; score=0.075 total
time= 1.1s
[CV 1/3] END C=0.45, degree=7, gamma=0.001, kernel=sigmoid;; score=0.441 total
time= 1.1s
[CV 2/3] END C=0.45, degree=7, gamma=0.001, kernel=sigmoid;; score=0.463 total
time= 1.1s
[CV 3/3] END C=0.45, degree=7, gamma=0.001, kernel=sigmoid;; score=0.454 total
time= 1.1s
[CV 1/3] END C=0.5, degree=4, gamma=scale, kernel=rbf;; score=0.820 total time=
1.0s
[CV 2/3] END C=0.5, degree=4, gamma=scale, kernel=rbf;; score=0.803 total time=
0.9s
[CV 3/3] END C=0.5, degree=4, gamma=scale, kernel=rbf;; score=0.772 total time=
0.8s
[CV 1/3] END C=0.5, degree=4, gamma=scale, kernel=linear;; score=0.845 total
time= 0.4s
[CV 2/3] END C=0.5, degree=4, gamma=scale, kernel=linear;; score=0.857 total
time= 0.4s
[CV 3/3] END C=0.5, degree=4, gamma=scale, kernel=linear;; score=0.820 total
time= 0.4s
[CV 1/3] END C=0.5, degree=4, gamma=scale, kernel=poly;; score=0.914 total time=
0.7s
[CV 2/3] END C=0.5, degree=4, gamma=scale, kernel=poly;; score=0.891 total time=
0.8s
[CV 3/3] END C=0.5, degree=4, gamma=scale, kernel=poly;; score=0.859 total time=
0.8s
[CV 1/3] END C=0.5, degree=4, gamma=scale, kernel=sigmoid;; score=0.674 total
time= 0.5s
[CV 2/3] END C=0.5, degree=4, gamma=scale, kernel=sigmoid;; score=0.711 total
time= 0.6s
[CV 3/3] END C=0.5, degree=4, gamma=scale, kernel=sigmoid;; score=0.680 total
time= 0.6s
[CV 1/3] END C=0.5, degree=4, gamma=auto, kernel=rbf;; score=0.445 total time=
1.3s
[CV 2/3] END C=0.5, degree=4, gamma=auto, kernel=rbf;; score=0.463 total time=
1.4s
[CV 3/3] END C=0.5, degree=4, gamma=auto, kernel=rbf;; score=0.458 total time=
1.3s
[CV 1/3] END C=0.5, degree=4, gamma=auto, kernel=linear;; score=0.845 total
time= 0.4s
[CV 2/3] END C=0.5, degree=4, gamma=auto, kernel=linear;; score=0.857 total
time= 0.4s
[CV 3/3] END C=0.5, degree=4, gamma=auto, kernel=linear;; score=0.820 total
time= 0.4s
[CV 1/3] END C=0.5, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=

```

1.2s  
[CV 2/3] END C=0.5, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=1.4s  
1.4s  
[CV 3/3] END C=0.5, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=1.2s  
1.2s  
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[CV 2/3] END C=0.5, degree=4, gamma=auto, kernel=sigmoid;; score=0.412 total time= 1.2s  
[CV 3/3] END C=0.5, degree=4, gamma=auto, kernel=sigmoid;; score=0.378 total time= 1.2s  
[CV 1/3] END C=0.5, degree=4, gamma=0.1, kernel=rbf;; score=0.658 total time=1.4s  
[CV 2/3] END C=0.5, degree=4, gamma=0.1, kernel=rbf;; score=0.668 total time=1.3s  
[CV 3/3] END C=0.5, degree=4, gamma=0.1, kernel=rbf;; score=0.667 total time=1.4s  
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[CV 3/3] END C=0.5, degree=4, gamma=0.1, kernel=sigmoid;; score=0.470 total time= 0.9s  
[CV 1/3] END C=0.5, degree=4, gamma=0.01, kernel=rbf;; score=0.737 total time=0.9s  
[CV 2/3] END C=0.5, degree=4, gamma=0.01, kernel=rbf;; score=0.752 total time=0.9s  
[CV 3/3] END C=0.5, degree=4, gamma=0.01, kernel=rbf;; score=0.704 total time=0.9s  
[CV 1/3] END C=0.5, degree=4, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.5, degree=4, gamma=0.01, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=0.5, degree=4, gamma=0.01, kernel=linear;; score=0.820 total time= 0.5s  
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1.2s  
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[CV 3/3] END C=0.5, degree=4, gamma=0.01, kernel=sigmoid;; score=0.637 total time= 0.7s  
[CV 1/3] END C=0.5, degree=4, gamma=0.001, kernel=rbf;; score=0.463 total time=1.3s  
[CV 2/3] END C=0.5, degree=4, gamma=0.001, kernel=rbf;; score=0.490 total time=1.5s  
[CV 3/3] END C=0.5, degree=4, gamma=0.001, kernel=rbf;; score=0.467 total time=1.3s  
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[CV 3/3] END C=0.5, degree=4, gamma=0.001, kernel=linear;; score=0.820 total time= 0.5s  
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[CV 3/3] END C=0.5, degree=5, gamma=scale, kernel=rbf;; score=0.772 total time=1.0s  
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[CV 3/3] END C=0.5, degree=5, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.5, degree=5, gamma=scale, kernel=poly;; score=0.899 total time=

0.9s  
[CV 2/3] END C=0.5, degree=5, gamma=scale, kernel=poly;; score=0.888 total time=0.9s  
[CV 3/3] END C=0.5, degree=5, gamma=scale, kernel=poly;; score=0.852 total time=0.9s  
[CV 1/3] END C=0.5, degree=5, gamma=scale, kernel=sigmoid;; score=0.674 total time= 0.7s  
[CV 2/3] END C=0.5, degree=5, gamma=scale, kernel=sigmoid;; score=0.711 total time= 0.6s  
[CV 3/3] END C=0.5, degree=5, gamma=scale, kernel=sigmoid;; score=0.680 total time= 0.7s  
[CV 1/3] END C=0.5, degree=5, gamma=auto, kernel=rbf;; score=0.445 total time=1.3s  
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[CV 3/3] END C=0.5, degree=5, gamma=auto, kernel=rbf;; score=0.458 total time=1.4s  
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[CV 3/3] END C=0.5, degree=5, gamma=auto, kernel=sigmoid;; score=0.378 total time= 1.1s  
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[CV 3/3] END C=0.5, degree=5, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
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0.8s  
[CV 2/3] END C=0.5, degree=5, gamma=0.1, kernel=poly;; score=0.888 total time=0.8s  
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[CV 3/3] END C=0.5, degree=5, gamma=0.1, kernel=sigmoid;; score=0.470 total time= 0.9s  
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[CV 3/3] END C=0.5, degree=5, gamma=0.01, kernel=sigmoid;; score=0.637 total time= 0.8s  
[CV 1/3] END C=0.5, degree=5, gamma=0.001, kernel=rbf;; score=0.463 total time=1.6s  
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1.1s  
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[CV 2/3] END C=0.5, degree=6, gamma=scale, kernel=rbf;; score=0.803 total time=1.0s  
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[CV 3/3] END C=0.5, degree=6, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.5, degree=6, gamma=scale, kernel=poly;; score=0.882 total time=1.0s  
[CV 2/3] END C=0.5, degree=6, gamma=scale, kernel=poly;; score=0.873 total time=1.0s  
[CV 3/3] END C=0.5, degree=6, gamma=scale, kernel=poly;; score=0.854 total time=1.0s  
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1.1s  
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1.3s  
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[CV 3/3] END C=0.5, degree=7, gamma=scale, kernel=rbf;; score=0.772 total time=2.5s  
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[CV 1/3] END C=0.5, degree=7, gamma=scale, kernel=sigmoid;; score=0.674 total time= 1.0s  
[CV 2/3] END C=0.5, degree=7, gamma=scale, kernel=sigmoid;; score=0.711 total time= 0.7s  
[CV 3/3] END C=0.5, degree=7, gamma=scale, kernel=sigmoid;; score=0.680 total time= 0.6s  
[CV 1/3] END C=0.5, degree=7, gamma=auto, kernel=rbf;; score=0.445 total time=1.3s  
[CV 2/3] END C=0.5, degree=7, gamma=auto, kernel=rbf;; score=0.463 total time=1.4s  
[CV 3/3] END C=0.5, degree=7, gamma=auto, kernel=rbf;; score=0.458 total time=1.3s  
[CV 1/3] END C=0.5, degree=7, gamma=auto, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.5, degree=7, gamma=auto, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.5, degree=7, gamma=auto, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.5, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 2/3] END C=0.5, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.0s  
[CV 3/3] END C=0.5, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.2s  
[CV 1/3] END C=0.5, degree=7, gamma=auto, kernel=sigmoid;; score=0.398 total time= 1.3s  
[CV 2/3] END C=0.5, degree=7, gamma=auto, kernel=sigmoid;; score=0.412 total time= 1.2s  
[CV 3/3] END C=0.5, degree=7, gamma=auto, kernel=sigmoid;; score=0.378 total time= 1.1s  
[CV 1/3] END C=0.5, degree=7, gamma=0.1, kernel=rbf;; score=0.658 total time=1.4s  
[CV 2/3] END C=0.5, degree=7, gamma=0.1, kernel=rbf;; score=0.668 total time=1.4s  
[CV 3/3] END C=0.5, degree=7, gamma=0.1, kernel=rbf;; score=0.667 total time=1.5s  
[CV 1/3] END C=0.5, degree=7, gamma=0.1, kernel=linear;; score=0.845 total time=0.6s  
[CV 2/3] END C=0.5, degree=7, gamma=0.1, kernel=linear;; score=0.857 total time=0.4s  
[CV 3/3] END C=0.5, degree=7, gamma=0.1, kernel=linear;; score=0.820 total time=0.5s  
[CV 1/3] END C=0.5, degree=7, gamma=0.1, kernel=poly;; score=0.870 total time=

1.1s  
[CV 2/3] END C=0.5, degree=7, gamma=0.1, kernel=poly;; score=0.858 total time=1.2s  
[CV 3/3] END C=0.5, degree=7, gamma=0.1, kernel=poly;; score=0.852 total time=1.2s  
[CV 1/3] END C=0.5, degree=7, gamma=0.1, kernel=sigmoid;; score=0.426 total time= 1.1s  
[CV 2/3] END C=0.5, degree=7, gamma=0.1, kernel=sigmoid;; score=0.456 total time= 1.0s  
[CV 3/3] END C=0.5, degree=7, gamma=0.1, kernel=sigmoid;; score=0.470 total time= 0.9s  
[CV 1/3] END C=0.5, degree=7, gamma=0.01, kernel=rbf;; score=0.737 total time=0.8s  
[CV 2/3] END C=0.5, degree=7, gamma=0.01, kernel=rbf;; score=0.752 total time=1.0s  
[CV 3/3] END C=0.5, degree=7, gamma=0.01, kernel=rbf;; score=0.704 total time=0.8s  
[CV 1/3] END C=0.5, degree=7, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.5, degree=7, gamma=0.01, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=0.5, degree=7, gamma=0.01, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=0.5, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.2s  
[CV 2/3] END C=0.5, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=0.5, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=0.5, degree=7, gamma=0.01, kernel=sigmoid;; score=0.634 total time= 0.6s  
[CV 2/3] END C=0.5, degree=7, gamma=0.01, kernel=sigmoid;; score=0.635 total time= 0.6s  
[CV 3/3] END C=0.5, degree=7, gamma=0.01, kernel=sigmoid;; score=0.637 total time= 0.6s  
[CV 1/3] END C=0.5, degree=7, gamma=0.001, kernel=rbf;; score=0.463 total time=1.2s  
[CV 2/3] END C=0.5, degree=7, gamma=0.001, kernel=rbf;; score=0.490 total time=1.1s  
[CV 3/3] END C=0.5, degree=7, gamma=0.001, kernel=rbf;; score=0.467 total time=1.2s  
[CV 1/3] END C=0.5, degree=7, gamma=0.001, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=0.5, degree=7, gamma=0.001, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=0.5, degree=7, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=0.5, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=

1.0s  
[CV 2/3] END C=0.5, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=0.5, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=1.2s  
[CV 1/3] END C=0.5, degree=7, gamma=0.001, kernel=sigmoid;; score=0.445 total time= 1.0s  
[CV 2/3] END C=0.5, degree=7, gamma=0.001, kernel=sigmoid;; score=0.463 total time= 1.1s  
[CV 3/3] END C=0.5, degree=7, gamma=0.001, kernel=sigmoid;; score=0.456 total time= 1.1s  
[CV 1/3] END C=1.0, degree=4, gamma=scale, kernel=rbf;; score=0.881 total time=1.0s  
[CV 2/3] END C=1.0, degree=4, gamma=scale, kernel=rbf;; score=0.869 total time=1.0s  
[CV 3/3] END C=1.0, degree=4, gamma=scale, kernel=rbf;; score=0.841 total time=0.9s  
[CV 1/3] END C=1.0, degree=4, gamma=scale, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=4, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=4, gamma=scale, kernel=poly;; score=0.914 total time=0.7s  
[CV 2/3] END C=1.0, degree=4, gamma=scale, kernel=poly;; score=0.891 total time=0.7s  
[CV 3/3] END C=1.0, degree=4, gamma=scale, kernel=poly;; score=0.856 total time=0.8s  
[CV 1/3] END C=1.0, degree=4, gamma=scale, kernel=sigmoid;; score=0.746 total time= 0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=scale, kernel=sigmoid;; score=0.750 total time= 0.5s  
[CV 3/3] END C=1.0, degree=4, gamma=scale, kernel=sigmoid;; score=0.716 total time= 0.5s  
[CV 1/3] END C=1.0, degree=4, gamma=auto, kernel=rbf;; score=0.481 total time=1.2s  
[CV 2/3] END C=1.0, degree=4, gamma=auto, kernel=rbf;; score=0.490 total time=1.1s  
[CV 3/3] END C=1.0, degree=4, gamma=auto, kernel=rbf;; score=0.482 total time=1.2s  
[CV 1/3] END C=1.0, degree=4, gamma=auto, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=auto, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=4, gamma=auto, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=

1.1s  
[CV 2/3] END C=1.0, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=1.0, degree=4, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=1.0, degree=4, gamma=auto, kernel=sigmoid;; score=0.445 total time= 1.0s  
[CV 2/3] END C=1.0, degree=4, gamma=auto, kernel=sigmoid;; score=0.463 total time= 1.1s  
[CV 3/3] END C=1.0, degree=4, gamma=auto, kernel=sigmoid;; score=0.460 total time= 1.0s  
[CV 1/3] END C=1.0, degree=4, gamma=0.1, kernel=rbf;; score=0.843 total time=1.3s  
[CV 2/3] END C=1.0, degree=4, gamma=0.1, kernel=rbf;; score=0.803 total time=1.4s  
[CV 3/3] END C=1.0, degree=4, gamma=0.1, kernel=rbf;; score=0.819 total time=1.4s  
[CV 1/3] END C=1.0, degree=4, gamma=0.1, kernel=linear;; score=0.845 total time=0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=0.1, kernel=linear;; score=0.857 total time=0.4s  
[CV 3/3] END C=1.0, degree=4, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
[CV 1/3] END C=1.0, degree=4, gamma=0.1, kernel=poly;; score=0.914 total time=0.8s  
[CV 2/3] END C=1.0, degree=4, gamma=0.1, kernel=poly;; score=0.891 total time=0.8s  
[CV 3/3] END C=1.0, degree=4, gamma=0.1, kernel=poly;; score=0.856 total time=0.9s  
[CV 1/3] END C=1.0, degree=4, gamma=0.1, kernel=sigmoid;; score=0.451 total time= 0.9s  
[CV 2/3] END C=1.0, degree=4, gamma=0.1, kernel=sigmoid;; score=0.496 total time= 0.9s  
[CV 3/3] END C=1.0, degree=4, gamma=0.1, kernel=sigmoid;; score=0.490 total time= 0.8s  
[CV 1/3] END C=1.0, degree=4, gamma=0.01, kernel=rbf;; score=0.827 total time=0.8s  
[CV 2/3] END C=1.0, degree=4, gamma=0.01, kernel=rbf;; score=0.816 total time=0.8s  
[CV 3/3] END C=1.0, degree=4, gamma=0.01, kernel=rbf;; score=0.787 total time=0.8s  
[CV 1/3] END C=1.0, degree=4, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=4, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=4, gamma=0.01, kernel=poly;; score=0.453 total time=



1.0s  
[CV 2/3] END C=1.0, degree=4, gamma=0.01, kernel=poly;; score=0.469 total time=1.1s  
[CV 3/3] END C=1.0, degree=4, gamma=0.01, kernel=poly;; score=0.452 total time=0.9s  
[CV 1/3] END C=1.0, degree=4, gamma=0.01, kernel=sigmoid;; score=0.741 total time= 0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=0.01, kernel=sigmoid;; score=0.745 total time= 0.6s  
[CV 3/3] END C=1.0, degree=4, gamma=0.01, kernel=sigmoid;; score=0.720 total time= 0.6s  
[CV 1/3] END C=1.0, degree=4, gamma=0.001, kernel=rbf;; score=0.522 total time=1.1s  
[CV 2/3] END C=1.0, degree=4, gamma=0.001, kernel=rbf;; score=0.527 total time=1.1s  
[CV 3/3] END C=1.0, degree=4, gamma=0.001, kernel=rbf;; score=0.526 total time=1.1s  
[CV 1/3] END C=1.0, degree=4, gamma=0.001, kernel=linear;; score=0.845 total time= 0.6s  
[CV 2/3] END C=1.0, degree=4, gamma=0.001, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=1.0, degree=4, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time=1.0s  
[CV 2/3] END C=1.0, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time=1.0s  
[CV 3/3] END C=1.0, degree=4, gamma=0.001, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=1.0, degree=4, gamma=0.001, kernel=sigmoid;; score=0.463 total time= 0.9s  
[CV 2/3] END C=1.0, degree=4, gamma=0.001, kernel=sigmoid;; score=0.490 total time= 0.9s  
[CV 3/3] END C=1.0, degree=4, gamma=0.001, kernel=sigmoid;; score=0.467 total time= 0.9s  
[CV 1/3] END C=1.0, degree=5, gamma=scale, kernel=rbf;; score=0.881 total time=0.9s  
[CV 2/3] END C=1.0, degree=5, gamma=scale, kernel=rbf;; score=0.869 total time=0.9s  
[CV 3/3] END C=1.0, degree=5, gamma=scale, kernel=rbf;; score=0.841 total time=0.9s  
[CV 1/3] END C=1.0, degree=5, gamma=scale, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=1.0, degree=5, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=5, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=5, gamma=scale, kernel=poly;; score=0.899 total time=

0.9s  
[CV 2/3] END C=1.0, degree=5, gamma=scale, kernel=poly;; score=0.888 total time=0.9s  
[CV 3/3] END C=1.0, degree=5, gamma=scale, kernel=poly;; score=0.852 total time=0.9s  
[CV 1/3] END C=1.0, degree=5, gamma=scale, kernel=sigmoid;; score=0.746 total time= 0.5s  
[CV 2/3] END C=1.0, degree=5, gamma=scale, kernel=sigmoid;; score=0.750 total time= 0.6s  
[CV 3/3] END C=1.0, degree=5, gamma=scale, kernel=sigmoid;; score=0.716 total time= 0.5s  
[CV 1/3] END C=1.0, degree=5, gamma=auto, kernel=rbf;; score=0.481 total time=1.1s  
[CV 2/3] END C=1.0, degree=5, gamma=auto, kernel=rbf;; score=0.490 total time=1.3s  
[CV 3/3] END C=1.0, degree=5, gamma=auto, kernel=rbf;; score=0.482 total time=1.2s  
[CV 1/3] END C=1.0, degree=5, gamma=auto, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=5, gamma=auto, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=5, gamma=auto, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=5, gamma=auto, kernel=poly;; score=0.075 total time=1.0s  
[CV 2/3] END C=1.0, degree=5, gamma=auto, kernel=poly;; score=0.075 total time=1.0s  
[CV 3/3] END C=1.0, degree=5, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=1.0, degree=5, gamma=auto, kernel=sigmoid;; score=0.445 total time= 1.0s  
[CV 2/3] END C=1.0, degree=5, gamma=auto, kernel=sigmoid;; score=0.463 total time= 1.0s  
[CV 3/3] END C=1.0, degree=5, gamma=auto, kernel=sigmoid;; score=0.460 total time= 0.9s  
[CV 1/3] END C=1.0, degree=5, gamma=0.1, kernel=rbf;; score=0.843 total time=1.3s  
[CV 2/3] END C=1.0, degree=5, gamma=0.1, kernel=rbf;; score=0.803 total time=1.3s  
[CV 3/3] END C=1.0, degree=5, gamma=0.1, kernel=rbf;; score=0.819 total time=1.4s  
[CV 1/3] END C=1.0, degree=5, gamma=0.1, kernel=linear;; score=0.845 total time=0.6s  
[CV 2/3] END C=1.0, degree=5, gamma=0.1, kernel=linear;; score=0.857 total time=0.5s  
[CV 3/3] END C=1.0, degree=5, gamma=0.1, kernel=linear;; score=0.820 total time=0.5s  
[CV 1/3] END C=1.0, degree=5, gamma=0.1, kernel=poly;; score=0.899 total time=

0.9s  
[CV 2/3] END C=1.0, degree=5, gamma=0.1, kernel=poly;; score=0.888 total time=1.1s  
[CV 3/3] END C=1.0, degree=5, gamma=0.1, kernel=poly;; score=0.852 total time=1.0s  
[CV 1/3] END C=1.0, degree=5, gamma=0.1, kernel=sigmoid;; score=0.451 total time= 0.9s  
[CV 2/3] END C=1.0, degree=5, gamma=0.1, kernel=sigmoid;; score=0.496 total time= 0.9s  
[CV 3/3] END C=1.0, degree=5, gamma=0.1, kernel=sigmoid;; score=0.490 total time= 0.9s  
[CV 1/3] END C=1.0, degree=5, gamma=0.01, kernel=rbf;; score=0.827 total time=0.8s  
[CV 2/3] END C=1.0, degree=5, gamma=0.01, kernel=rbf;; score=0.816 total time=0.9s  
[CV 3/3] END C=1.0, degree=5, gamma=0.01, kernel=rbf;; score=0.787 total time=1.0s  
[CV 1/3] END C=1.0, degree=5, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=5, gamma=0.01, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=1.0, degree=5, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=5, gamma=0.01, kernel=poly;; score=0.411 total time=1.1s  
[CV 2/3] END C=1.0, degree=5, gamma=0.01, kernel=poly;; score=0.430 total time=1.1s  
[CV 3/3] END C=1.0, degree=5, gamma=0.01, kernel=poly;; score=0.388 total time=1.3s  
[CV 1/3] END C=1.0, degree=5, gamma=0.01, kernel=sigmoid;; score=0.741 total time= 0.5s  
[CV 2/3] END C=1.0, degree=5, gamma=0.01, kernel=sigmoid;; score=0.745 total time= 0.6s  
[CV 3/3] END C=1.0, degree=5, gamma=0.01, kernel=sigmoid;; score=0.720 total time= 0.6s  
[CV 1/3] END C=1.0, degree=5, gamma=0.001, kernel=rbf;; score=0.522 total time=1.0s  
[CV 2/3] END C=1.0, degree=5, gamma=0.001, kernel=rbf;; score=0.527 total time=1.0s  
[CV 3/3] END C=1.0, degree=5, gamma=0.001, kernel=rbf;; score=0.526 total time=1.1s  
[CV 1/3] END C=1.0, degree=5, gamma=0.001, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=5, gamma=0.001, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=5, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=

1.0s  
[CV 2/3] END C=1.0, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=1.0s  
[CV 3/3] END C=1.0, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=1.0s  
[CV 1/3] END C=1.0, degree=5, gamma=0.001, kernel=sigmoid;; score=0.463 total time= 0.9s  
[CV 2/3] END C=1.0, degree=5, gamma=0.001, kernel=sigmoid;; score=0.490 total time= 0.9s  
[CV 3/3] END C=1.0, degree=5, gamma=0.001, kernel=sigmoid;; score=0.467 total time= 1.1s  
[CV 1/3] END C=1.0, degree=6, gamma=scale, kernel=rbf;; score=0.881 total time=1.2s  
[CV 2/3] END C=1.0, degree=6, gamma=scale, kernel=rbf;; score=0.869 total time=1.1s  
[CV 3/3] END C=1.0, degree=6, gamma=scale, kernel=rbf;; score=0.841 total time=0.9s  
[CV 1/3] END C=1.0, degree=6, gamma=scale, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=6, gamma=scale, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=1.0, degree=6, gamma=scale, kernel=poly;; score=0.882 total time=0.9s  
[CV 2/3] END C=1.0, degree=6, gamma=scale, kernel=poly;; score=0.873 total time=0.9s  
[CV 3/3] END C=1.0, degree=6, gamma=scale, kernel=poly;; score=0.854 total time=0.9s  
[CV 1/3] END C=1.0, degree=6, gamma=scale, kernel=sigmoid;; score=0.746 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=scale, kernel=sigmoid;; score=0.750 total time= 0.5s  
[CV 3/3] END C=1.0, degree=6, gamma=scale, kernel=sigmoid;; score=0.716 total time= 0.6s  
[CV 1/3] END C=1.0, degree=6, gamma=auto, kernel=rbf;; score=0.481 total time=1.1s  
[CV 2/3] END C=1.0, degree=6, gamma=auto, kernel=rbf;; score=0.490 total time=1.2s  
[CV 3/3] END C=1.0, degree=6, gamma=auto, kernel=rbf;; score=0.482 total time=1.1s  
[CV 1/3] END C=1.0, degree=6, gamma=auto, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=auto, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=6, gamma=auto, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=

1.0s  
[CV 2/3] END C=1.0, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=1.0, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=1.0, degree=6, gamma=auto, kernel=sigmoid;; score=0.445 total time= 1.1s  
[CV 2/3] END C=1.0, degree=6, gamma=auto, kernel=sigmoid;; score=0.463 total time= 1.0s  
[CV 3/3] END C=1.0, degree=6, gamma=auto, kernel=sigmoid;; score=0.460 total time= 1.0s  
[CV 1/3] END C=1.0, degree=6, gamma=0.1, kernel=rbf;; score=0.843 total time=1.3s  
[CV 2/3] END C=1.0, degree=6, gamma=0.1, kernel=rbf;; score=0.803 total time=1.4s  
[CV 3/3] END C=1.0, degree=6, gamma=0.1, kernel=rbf;; score=0.819 total time=1.4s  
[CV 1/3] END C=1.0, degree=6, gamma=0.1, kernel=linear;; score=0.845 total time=0.4s  
[CV 2/3] END C=1.0, degree=6, gamma=0.1, kernel=linear;; score=0.857 total time=0.4s  
[CV 3/3] END C=1.0, degree=6, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
[CV 1/3] END C=1.0, degree=6, gamma=0.1, kernel=poly;; score=0.882 total time=0.9s  
[CV 2/3] END C=1.0, degree=6, gamma=0.1, kernel=poly;; score=0.873 total time=0.9s  
[CV 3/3] END C=1.0, degree=6, gamma=0.1, kernel=poly;; score=0.854 total time=0.9s  
[CV 1/3] END C=1.0, degree=6, gamma=0.1, kernel=sigmoid;; score=0.451 total time= 0.8s  
[CV 2/3] END C=1.0, degree=6, gamma=0.1, kernel=sigmoid;; score=0.496 total time= 0.9s  
[CV 3/3] END C=1.0, degree=6, gamma=0.1, kernel=sigmoid;; score=0.490 total time= 0.8s  
[CV 1/3] END C=1.0, degree=6, gamma=0.01, kernel=rbf;; score=0.827 total time=0.8s  
[CV 2/3] END C=1.0, degree=6, gamma=0.01, kernel=rbf;; score=0.816 total time=0.8s  
[CV 3/3] END C=1.0, degree=6, gamma=0.01, kernel=rbf;; score=0.787 total time=0.8s  
[CV 1/3] END C=1.0, degree=6, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=6, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
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1.0s  
[CV 2/3] END C=1.0, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=1.0, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=1.0s  
[CV 1/3] END C=1.0, degree=6, gamma=0.01, kernel=sigmoid;; score=0.741 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=0.01, kernel=sigmoid;; score=0.745 total time= 0.5s  
[CV 3/3] END C=1.0, degree=6, gamma=0.01, kernel=sigmoid;; score=0.720 total time= 0.6s  
[CV 1/3] END C=1.0, degree=6, gamma=0.001, kernel=rbf;; score=0.522 total time=1.0s  
[CV 2/3] END C=1.0, degree=6, gamma=0.001, kernel=rbf;; score=0.527 total time=1.1s  
[CV 3/3] END C=1.0, degree=6, gamma=0.001, kernel=rbf;; score=0.526 total time=1.2s  
[CV 1/3] END C=1.0, degree=6, gamma=0.001, kernel=linear;; score=0.845 total time= 0.6s  
[CV 2/3] END C=1.0, degree=6, gamma=0.001, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=1.0, degree=6, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time=1.4s  
[CV 2/3] END C=1.0, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time=1.4s  
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[CV 2/3] END C=1.0, degree=6, gamma=0.001, kernel=sigmoid;; score=0.490 total time= 0.9s  
[CV 3/3] END C=1.0, degree=6, gamma=0.001, kernel=sigmoid;; score=0.467 total time= 1.0s  
[CV 1/3] END C=1.0, degree=7, gamma=scale, kernel=rbf;; score=0.881 total time=0.9s  
[CV 2/3] END C=1.0, degree=7, gamma=scale, kernel=rbf;; score=0.869 total time=0.9s  
[CV 3/3] END C=1.0, degree=7, gamma=scale, kernel=rbf;; score=0.841 total time=1.0s  
[CV 1/3] END C=1.0, degree=7, gamma=scale, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=7, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=7, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=7, gamma=scale, kernel=poly;; score=0.870 total time=

1.1s  
[CV 2/3] END C=1.0, degree=7, gamma=scale, kernel=poly;; score=0.858 total time=1.1s  
[CV 3/3] END C=1.0, degree=7, gamma=scale, kernel=poly;; score=0.852 total time=1.1s  
[CV 1/3] END C=1.0, degree=7, gamma=scale, kernel=sigmoid;; score=0.746 total time= 0.7s  
[CV 2/3] END C=1.0, degree=7, gamma=scale, kernel=sigmoid;; score=0.750 total time= 0.6s  
[CV 3/3] END C=1.0, degree=7, gamma=scale, kernel=sigmoid;; score=0.716 total time= 0.6s  
[CV 1/3] END C=1.0, degree=7, gamma=auto, kernel=rbf;; score=0.481 total time=1.3s  
[CV 2/3] END C=1.0, degree=7, gamma=auto, kernel=rbf;; score=0.490 total time=1.2s  
[CV 3/3] END C=1.0, degree=7, gamma=auto, kernel=rbf;; score=0.482 total time=1.2s  
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[CV 2/3] END C=1.0, degree=7, gamma=auto, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=7, gamma=auto, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
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[CV 2/3] END C=1.0, degree=7, gamma=0.1, kernel=rbf;; score=0.803 total time=1.4s  
[CV 3/3] END C=1.0, degree=7, gamma=0.1, kernel=rbf;; score=0.819 total time=1.4s  
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[CV 3/3] END C=1.0, degree=7, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
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1.0s  
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[CV 3/3] END C=1.0, degree=7, gamma=0.1, kernel=poly;; score=0.852 total time=1.0s  
[CV 1/3] END C=1.0, degree=7, gamma=0.1, kernel=sigmoid;; score=0.451 total time= 0.8s  
[CV 2/3] END C=1.0, degree=7, gamma=0.1, kernel=sigmoid;; score=0.496 total time= 0.9s  
[CV 3/3] END C=1.0, degree=7, gamma=0.1, kernel=sigmoid;; score=0.490 total time= 0.8s  
[CV 1/3] END C=1.0, degree=7, gamma=0.01, kernel=rbf;; score=0.827 total time=0.8s  
[CV 2/3] END C=1.0, degree=7, gamma=0.01, kernel=rbf;; score=0.816 total time=0.8s  
[CV 3/3] END C=1.0, degree=7, gamma=0.01, kernel=rbf;; score=0.787 total time=0.9s  
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[CV 1/3] END C=1.0, degree=7, gamma=0.01, kernel=sigmoid;; score=0.741 total time= 0.5s  
[CV 2/3] END C=1.0, degree=7, gamma=0.01, kernel=sigmoid;; score=0.745 total time= 0.6s  
[CV 3/3] END C=1.0, degree=7, gamma=0.01, kernel=sigmoid;; score=0.720 total time= 0.6s  
[CV 1/3] END C=1.0, degree=7, gamma=0.001, kernel=rbf;; score=0.522 total time=1.0s  
[CV 2/3] END C=1.0, degree=7, gamma=0.001, kernel=rbf;; score=0.527 total time=1.1s  
[CV 3/3] END C=1.0, degree=7, gamma=0.001, kernel=rbf;; score=0.526 total time=1.0s  
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[CV 1/3] END C=1.0, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=



1.0s  
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[CV 2/3] END C=1.0, degree=7, gamma=0.001, kernel=sigmoid;; score=0.490 total time= 1.0s  
[CV 3/3] END C=1.0, degree=7, gamma=0.001, kernel=sigmoid;; score=0.467 total time= 0.9s  
[CV 1/3] END C=1.0, degree=4, gamma=scale, kernel=rbf;; score=0.881 total time=1.0s  
[CV 2/3] END C=1.0, degree=4, gamma=scale, kernel=rbf;; score=0.869 total time=0.9s  
[CV 3/3] END C=1.0, degree=4, gamma=scale, kernel=rbf;; score=0.841 total time=0.9s  
[CV 1/3] END C=1.0, degree=4, gamma=scale, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
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[CV 1/3] END C=1.0, degree=4, gamma=scale, kernel=poly;; score=0.914 total time=0.7s  
[CV 2/3] END C=1.0, degree=4, gamma=scale, kernel=poly;; score=0.891 total time=0.8s  
[CV 3/3] END C=1.0, degree=4, gamma=scale, kernel=poly;; score=0.856 total time=0.9s  
[CV 1/3] END C=1.0, degree=4, gamma=scale, kernel=sigmoid;; score=0.746 total time= 0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=scale, kernel=sigmoid;; score=0.750 total time= 0.5s  
[CV 3/3] END C=1.0, degree=4, gamma=scale, kernel=sigmoid;; score=0.716 total time= 0.5s  
[CV 1/3] END C=1.0, degree=4, gamma=auto, kernel=rbf;; score=0.481 total time=1.1s  
[CV 2/3] END C=1.0, degree=4, gamma=auto, kernel=rbf;; score=0.490 total time=1.6s  
[CV 3/3] END C=1.0, degree=4, gamma=auto, kernel=rbf;; score=0.482 total time=1.3s  
[CV 1/3] END C=1.0, degree=4, gamma=auto, kernel=linear;; score=0.845 total time= 0.5s  
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1.1s  
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[CV 2/3] END C=1.0, degree=4, gamma=auto, kernel=sigmoid;; score=0.463 total time= 1.2s  
[CV 3/3] END C=1.0, degree=4, gamma=auto, kernel=sigmoid;; score=0.460 total time= 1.3s  
[CV 1/3] END C=1.0, degree=4, gamma=0.1, kernel=rbf;; score=0.843 total time=1.6s  
[CV 2/3] END C=1.0, degree=4, gamma=0.1, kernel=rbf;; score=0.803 total time=1.4s  
[CV 3/3] END C=1.0, degree=4, gamma=0.1, kernel=rbf;; score=0.819 total time=1.5s  
[CV 1/3] END C=1.0, degree=4, gamma=0.1, kernel=linear;; score=0.845 total time=0.5s  
[CV 2/3] END C=1.0, degree=4, gamma=0.1, kernel=linear;; score=0.857 total time=0.4s  
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[CV 2/3] END C=1.0, degree=4, gamma=0.1, kernel=sigmoid;; score=0.496 total time= 0.9s  
[CV 3/3] END C=1.0, degree=4, gamma=0.1, kernel=sigmoid;; score=0.490 total time= 0.9s  
[CV 1/3] END C=1.0, degree=4, gamma=0.01, kernel=rbf;; score=0.827 total time=0.7s  
[CV 2/3] END C=1.0, degree=4, gamma=0.01, kernel=rbf;; score=0.816 total time=0.8s  
[CV 3/3] END C=1.0, degree=4, gamma=0.01, kernel=rbf;; score=0.787 total time=0.7s  
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0.9s  
[CV 2/3] END C=1.0, degree=4, gamma=0.01, kernel=poly;; score=0.469 total time=1.0s  
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[CV 2/3] END C=1.0, degree=4, gamma=0.01, kernel=sigmoid;; score=0.745 total time= 0.6s  
[CV 3/3] END C=1.0, degree=4, gamma=0.01, kernel=sigmoid;; score=0.720 total time= 0.6s  
[CV 1/3] END C=1.0, degree=4, gamma=0.001, kernel=rbf;; score=0.522 total time=1.0s  
[CV 2/3] END C=1.0, degree=4, gamma=0.001, kernel=rbf;; score=0.527 total time=1.1s  
[CV 3/3] END C=1.0, degree=4, gamma=0.001, kernel=rbf;; score=0.526 total time=1.1s  
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[CV 2/3] END C=1.0, degree=4, gamma=0.001, kernel=sigmoid;; score=0.490 total time= 0.9s  
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[CV 1/3] END C=1.0, degree=5, gamma=scale, kernel=rbf;; score=0.881 total time=0.9s  
[CV 2/3] END C=1.0, degree=5, gamma=scale, kernel=rbf;; score=0.869 total time=0.9s  
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0.9s  
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[CV 3/3] END C=1.0, degree=5, gamma=scale, kernel=poly;; score=0.852 total time=1.0s  
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[CV 2/3] END C=1.0, degree=5, gamma=scale, kernel=sigmoid;; score=0.750 total time= 0.6s  
[CV 3/3] END C=1.0, degree=5, gamma=scale, kernel=sigmoid;; score=0.716 total time= 0.6s  
[CV 1/3] END C=1.0, degree=5, gamma=auto, kernel=rbf;; score=0.481 total time=1.3s  
[CV 2/3] END C=1.0, degree=5, gamma=auto, kernel=rbf;; score=0.490 total time=1.3s  
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[CV 3/3] END C=1.0, degree=5, gamma=auto, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=5, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
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[CV 3/3] END C=1.0, degree=5, gamma=0.1, kernel=linear;; score=0.820 total time=0.5s  
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1.0s  
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[CV 3/3] END C=1.0, degree=5, gamma=0.1, kernel=poly;; score=0.852 total time=0.9s  
[CV 1/3] END C=1.0, degree=5, gamma=0.1, kernel=sigmoid;; score=0.451 total time= 1.0s  
[CV 2/3] END C=1.0, degree=5, gamma=0.1, kernel=sigmoid;; score=0.496 total time= 0.9s  
[CV 3/3] END C=1.0, degree=5, gamma=0.1, kernel=sigmoid;; score=0.490 total time= 0.8s  
[CV 1/3] END C=1.0, degree=5, gamma=0.01, kernel=rbf;; score=0.827 total time=0.8s  
[CV 2/3] END C=1.0, degree=5, gamma=0.01, kernel=rbf;; score=0.816 total time=0.8s  
[CV 3/3] END C=1.0, degree=5, gamma=0.01, kernel=rbf;; score=0.787 total time=0.8s  
[CV 1/3] END C=1.0, degree=5, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=5, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=5, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=5, gamma=0.01, kernel=poly;; score=0.411 total time=1.2s  
[CV 2/3] END C=1.0, degree=5, gamma=0.01, kernel=poly;; score=0.430 total time=1.2s  
[CV 3/3] END C=1.0, degree=5, gamma=0.01, kernel=poly;; score=0.388 total time=1.1s  
[CV 1/3] END C=1.0, degree=5, gamma=0.01, kernel=sigmoid;; score=0.741 total time= 0.6s  
[CV 2/3] END C=1.0, degree=5, gamma=0.01, kernel=sigmoid;; score=0.745 total time= 0.6s  
[CV 3/3] END C=1.0, degree=5, gamma=0.01, kernel=sigmoid;; score=0.720 total time= 0.6s  
[CV 1/3] END C=1.0, degree=5, gamma=0.001, kernel=rbf;; score=0.522 total time=1.0s  
[CV 2/3] END C=1.0, degree=5, gamma=0.001, kernel=rbf;; score=0.527 total time=1.0s  
[CV 3/3] END C=1.0, degree=5, gamma=0.001, kernel=rbf;; score=0.526 total time=1.0s  
[CV 1/3] END C=1.0, degree=5, gamma=0.001, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=5, gamma=0.001, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=1.0, degree=5, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=

1.0s  
[CV 2/3] END C=1.0, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=1.0s  
[CV 3/3] END C=1.0, degree=5, gamma=0.001, kernel=poly;; score=0.075 total time=1.0s  
[CV 1/3] END C=1.0, degree=5, gamma=0.001, kernel=sigmoid;; score=0.463 total time= 0.9s  
[CV 2/3] END C=1.0, degree=5, gamma=0.001, kernel=sigmoid;; score=0.490 total time= 0.8s  
[CV 3/3] END C=1.0, degree=5, gamma=0.001, kernel=sigmoid;; score=0.467 total time= 0.8s  
[CV 1/3] END C=1.0, degree=6, gamma=scale, kernel=rbf;; score=0.881 total time=0.9s  
[CV 2/3] END C=1.0, degree=6, gamma=scale, kernel=rbf;; score=0.869 total time=0.9s  
[CV 3/3] END C=1.0, degree=6, gamma=scale, kernel=rbf;; score=0.841 total time=0.8s  
[CV 1/3] END C=1.0, degree=6, gamma=scale, kernel=linear;; score=0.845 total time= 0.4s  
[CV 2/3] END C=1.0, degree=6, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=6, gamma=scale, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=1.0, degree=6, gamma=scale, kernel=poly;; score=0.882 total time=0.9s  
[CV 2/3] END C=1.0, degree=6, gamma=scale, kernel=poly;; score=0.873 total time=0.9s  
[CV 3/3] END C=1.0, degree=6, gamma=scale, kernel=poly;; score=0.854 total time=0.9s  
[CV 1/3] END C=1.0, degree=6, gamma=scale, kernel=sigmoid;; score=0.746 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=scale, kernel=sigmoid;; score=0.750 total time= 0.5s  
[CV 3/3] END C=1.0, degree=6, gamma=scale, kernel=sigmoid;; score=0.716 total time= 0.5s  
[CV 1/3] END C=1.0, degree=6, gamma=auto, kernel=rbf;; score=0.481 total time=1.1s  
[CV 2/3] END C=1.0, degree=6, gamma=auto, kernel=rbf;; score=0.490 total time=1.1s  
[CV 3/3] END C=1.0, degree=6, gamma=auto, kernel=rbf;; score=0.482 total time=1.1s  
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[CV 3/3] END C=1.0, degree=6, gamma=auto, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=1.0, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=

1.1s  
[CV 2/3] END C=1.0, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=1.2s  
[CV 3/3] END C=1.0, degree=6, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=1.0, degree=6, gamma=auto, kernel=sigmoid;; score=0.445 total time= 1.1s  
[CV 2/3] END C=1.0, degree=6, gamma=auto, kernel=sigmoid;; score=0.463 total time= 1.0s  
[CV 3/3] END C=1.0, degree=6, gamma=auto, kernel=sigmoid;; score=0.460 total time= 0.9s  
[CV 1/3] END C=1.0, degree=6, gamma=0.1, kernel=rbf;; score=0.843 total time=1.3s  
[CV 2/3] END C=1.0, degree=6, gamma=0.1, kernel=rbf;; score=0.803 total time=1.4s  
[CV 3/3] END C=1.0, degree=6, gamma=0.1, kernel=rbf;; score=0.819 total time=1.3s  
[CV 1/3] END C=1.0, degree=6, gamma=0.1, kernel=linear;; score=0.845 total time=0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=0.1, kernel=linear;; score=0.857 total time=0.4s  
[CV 3/3] END C=1.0, degree=6, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
[CV 1/3] END C=1.0, degree=6, gamma=0.1, kernel=poly;; score=0.882 total time=0.9s  
[CV 2/3] END C=1.0, degree=6, gamma=0.1, kernel=poly;; score=0.873 total time=0.9s  
[CV 3/3] END C=1.0, degree=6, gamma=0.1, kernel=poly;; score=0.854 total time=0.9s  
[CV 1/3] END C=1.0, degree=6, gamma=0.1, kernel=sigmoid;; score=0.451 total time= 0.8s  
[CV 2/3] END C=1.0, degree=6, gamma=0.1, kernel=sigmoid;; score=0.496 total time= 0.8s  
[CV 3/3] END C=1.0, degree=6, gamma=0.1, kernel=sigmoid;; score=0.490 total time= 0.8s  
[CV 1/3] END C=1.0, degree=6, gamma=0.01, kernel=rbf;; score=0.827 total time=0.8s  
[CV 2/3] END C=1.0, degree=6, gamma=0.01, kernel=rbf;; score=0.816 total time=0.8s  
[CV 3/3] END C=1.0, degree=6, gamma=0.01, kernel=rbf;; score=0.787 total time=0.8s  
[CV 1/3] END C=1.0, degree=6, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=6, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=

1.1s  
[CV 2/3] END C=1.0, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=1.0s  
[CV 3/3] END C=1.0, degree=6, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=1.0, degree=6, gamma=0.01, kernel=sigmoid;; score=0.741 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=0.01, kernel=sigmoid;; score=0.745 total time= 0.5s  
[CV 3/3] END C=1.0, degree=6, gamma=0.01, kernel=sigmoid;; score=0.720 total time= 0.6s  
[CV 1/3] END C=1.0, degree=6, gamma=0.001, kernel=rbf;; score=0.522 total time=0.9s  
[CV 2/3] END C=1.0, degree=6, gamma=0.001, kernel=rbf;; score=0.527 total time=1.1s  
[CV 3/3] END C=1.0, degree=6, gamma=0.001, kernel=rbf;; score=0.526 total time=1.0s  
[CV 1/3] END C=1.0, degree=6, gamma=0.001, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=6, gamma=0.001, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=1.0, degree=6, gamma=0.001, kernel=linear;; score=0.820 total time= 0.4s  
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[CV 2/3] END C=1.0, degree=6, gamma=0.001, kernel=poly;; score=0.075 total time=1.1s  
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[CV 1/3] END C=1.0, degree=6, gamma=0.001, kernel=sigmoid;; score=0.463 total time= 0.9s  
[CV 2/3] END C=1.0, degree=6, gamma=0.001, kernel=sigmoid;; score=0.490 total time= 0.9s  
[CV 3/3] END C=1.0, degree=6, gamma=0.001, kernel=sigmoid;; score=0.467 total time= 0.9s  
[CV 1/3] END C=1.0, degree=7, gamma=scale, kernel=rbf;; score=0.881 total time=1.0s  
[CV 2/3] END C=1.0, degree=7, gamma=scale, kernel=rbf;; score=0.869 total time=0.9s  
[CV 3/3] END C=1.0, degree=7, gamma=scale, kernel=rbf;; score=0.841 total time=0.9s  
[CV 1/3] END C=1.0, degree=7, gamma=scale, kernel=linear;; score=0.845 total time= 0.6s  
[CV 2/3] END C=1.0, degree=7, gamma=scale, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=7, gamma=scale, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=7, gamma=scale, kernel=poly;; score=0.870 total time=



1.0s  
[CV 2/3] END C=1.0, degree=7, gamma=scale, kernel=poly;; score=0.858 total time=1.0s  
[CV 3/3] END C=1.0, degree=7, gamma=scale, kernel=poly;; score=0.852 total time=1.0s  
[CV 1/3] END C=1.0, degree=7, gamma=scale, kernel=sigmoid;; score=0.746 total time= 0.6s  
[CV 2/3] END C=1.0, degree=7, gamma=scale, kernel=sigmoid;; score=0.750 total time= 0.5s  
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[CV 1/3] END C=1.0, degree=7, gamma=auto, kernel=rbf;; score=0.481 total time=1.1s  
[CV 2/3] END C=1.0, degree=7, gamma=auto, kernel=rbf;; score=0.490 total time=1.2s  
[CV 3/3] END C=1.0, degree=7, gamma=auto, kernel=rbf;; score=0.482 total time=1.2s  
[CV 1/3] END C=1.0, degree=7, gamma=auto, kernel=linear;; score=0.845 total time= 0.4s  
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[CV 3/3] END C=1.0, degree=7, gamma=auto, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=1.0, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.0s  
[CV 2/3] END C=1.0, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=1.0, degree=7, gamma=auto, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=1.0, degree=7, gamma=auto, kernel=sigmoid;; score=0.445 total time= 1.1s  
[CV 2/3] END C=1.0, degree=7, gamma=auto, kernel=sigmoid;; score=0.463 total time= 1.1s  
[CV 3/3] END C=1.0, degree=7, gamma=auto, kernel=sigmoid;; score=0.460 total time= 1.1s  
[CV 1/3] END C=1.0, degree=7, gamma=0.1, kernel=rbf;; score=0.843 total time=1.4s  
[CV 2/3] END C=1.0, degree=7, gamma=0.1, kernel=rbf;; score=0.803 total time=1.5s  
[CV 3/3] END C=1.0, degree=7, gamma=0.1, kernel=rbf;; score=0.819 total time=1.5s  
[CV 1/3] END C=1.0, degree=7, gamma=0.1, kernel=linear;; score=0.845 total time=0.5s  
[CV 2/3] END C=1.0, degree=7, gamma=0.1, kernel=linear;; score=0.857 total time=0.4s  
[CV 3/3] END C=1.0, degree=7, gamma=0.1, kernel=linear;; score=0.820 total time=0.4s  
[CV 1/3] END C=1.0, degree=7, gamma=0.1, kernel=poly;; score=0.870 total time=

0.9s  
[CV 2/3] END C=1.0, degree=7, gamma=0.1, kernel=poly;; score=0.858 total time=0.9s  
[CV 3/3] END C=1.0, degree=7, gamma=0.1, kernel=poly;; score=0.852 total time=0.9s  
[CV 1/3] END C=1.0, degree=7, gamma=0.1, kernel=sigmoid;; score=0.451 total time= 0.8s  
[CV 2/3] END C=1.0, degree=7, gamma=0.1, kernel=sigmoid;; score=0.496 total time= 0.8s  
[CV 3/3] END C=1.0, degree=7, gamma=0.1, kernel=sigmoid;; score=0.490 total time= 0.8s  
[CV 1/3] END C=1.0, degree=7, gamma=0.01, kernel=rbf;; score=0.827 total time=0.8s  
[CV 2/3] END C=1.0, degree=7, gamma=0.01, kernel=rbf;; score=0.816 total time=0.8s  
[CV 3/3] END C=1.0, degree=7, gamma=0.01, kernel=rbf;; score=0.787 total time=0.8s  
[CV 1/3] END C=1.0, degree=7, gamma=0.01, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=7, gamma=0.01, kernel=linear;; score=0.857 total time= 0.4s  
[CV 3/3] END C=1.0, degree=7, gamma=0.01, kernel=linear;; score=0.820 total time= 0.4s  
[CV 1/3] END C=1.0, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.0s  
[CV 2/3] END C=1.0, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 3/3] END C=1.0, degree=7, gamma=0.01, kernel=poly;; score=0.075 total time=1.1s  
[CV 1/3] END C=1.0, degree=7, gamma=0.01, kernel=sigmoid;; score=0.741 total time= 0.6s  
[CV 2/3] END C=1.0, degree=7, gamma=0.01, kernel=sigmoid;; score=0.745 total time= 0.7s  
[CV 3/3] END C=1.0, degree=7, gamma=0.01, kernel=sigmoid;; score=0.720 total time= 0.8s  
[CV 1/3] END C=1.0, degree=7, gamma=0.001, kernel=rbf;; score=0.522 total time=1.6s  
[CV 2/3] END C=1.0, degree=7, gamma=0.001, kernel=rbf;; score=0.527 total time=1.4s  
[CV 3/3] END C=1.0, degree=7, gamma=0.001, kernel=rbf;; score=0.526 total time=1.2s  
[CV 1/3] END C=1.0, degree=7, gamma=0.001, kernel=linear;; score=0.845 total time= 0.5s  
[CV 2/3] END C=1.0, degree=7, gamma=0.001, kernel=linear;; score=0.857 total time= 0.5s  
[CV 3/3] END C=1.0, degree=7, gamma=0.001, kernel=linear;; score=0.820 total time= 0.5s  
[CV 1/3] END C=1.0, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=

```

1.4s
[CV 2/3] END C=1.0, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=
1.1s
[CV 3/3] END C=1.0, degree=7, gamma=0.001, kernel=poly;; score=0.075 total time=
1.1s
[CV 1/3] END C=1.0, degree=7, gamma=0.001, kernel=sigmoid;; score=0.463 total
time= 1.0s
[CV 2/3] END C=1.0, degree=7, gamma=0.001, kernel=sigmoid;; score=0.490 total
time= 0.9s
[CV 3/3] END C=1.0, degree=7, gamma=0.001, kernel=sigmoid;; score=0.467 total
time= 0.9s

```

```

GridSearchCV(cv=3, estimator=SVC(),
             param_grid={'C': [0.4, 0.45, 0.5, 1.0, 1.0],
                         'degree': [4, 5, 6, 7],
                         'gamma': ['scale', 'auto', 0.1, 0.01, 0.001],
                         'kernel': ['rbf', 'linear', 'poly', 'sigmoid']},
             scoring='f1_macro', verbose=3)

```

```

best_svm = grid_search_svm.best_estimator_
print("Best parameters:", grid_search_svm.best_params_)

y_pred_svm = best_svm.predict(test_features)

joblib.dump(best_svm, project_dir + '\\joblib\\best_svm_model.joblib')

```

Best parameters: {'C': 0.45, 'degree': 4, 'gamma': 'scale', 'kernel': 'poly'}

```

['d:\\ASUS\\Deploy-Traffic-Sign-Classification-through-
Images\\joblib\\best_svm_model.joblib']

```

## 8 Predict on test images for KNN

```

report_knn = classification_report(test_labels_encoded, y_pred_knn,
    ↪target_names=label_encoder.classes_)
print(report_knn)

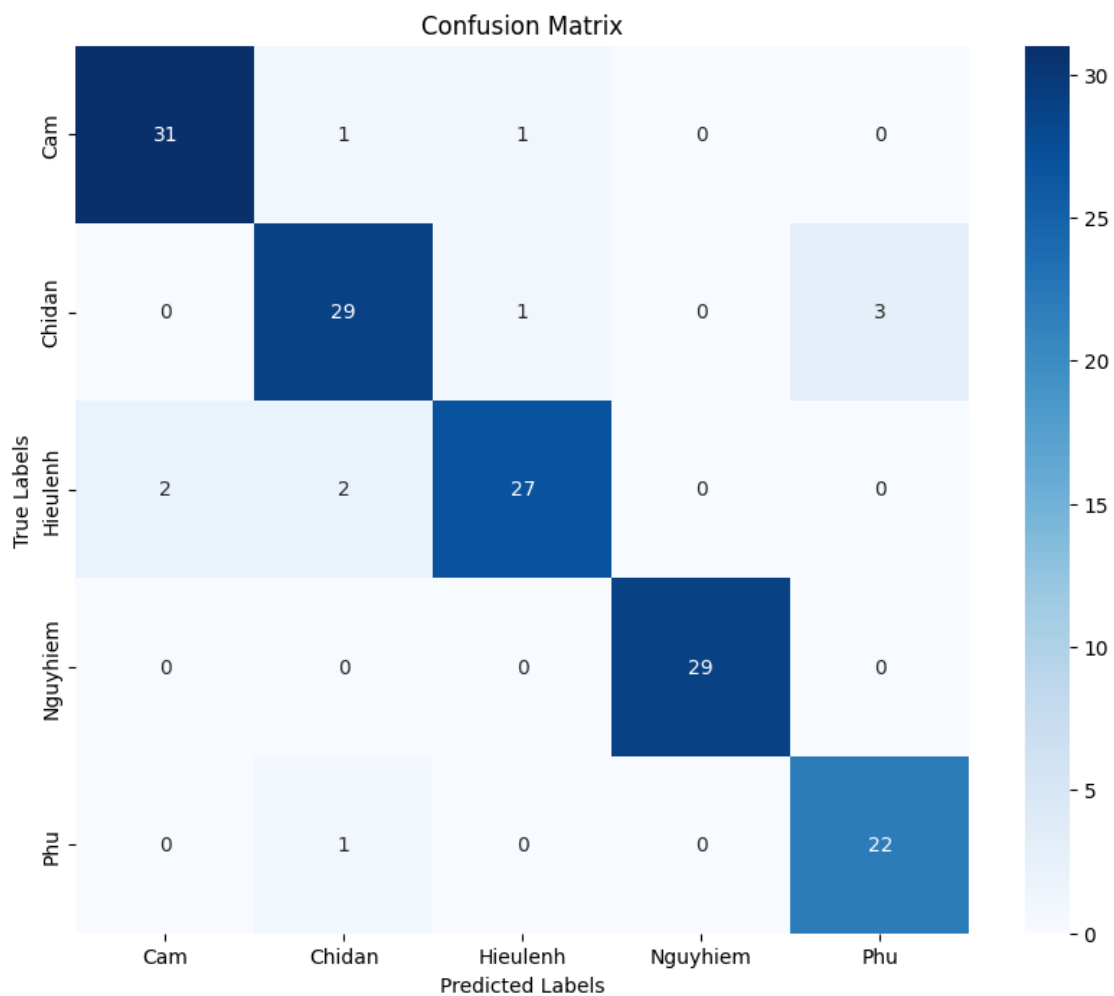
```

	precision	recall	f1-score	support
Cam	0.94	0.94	0.94	33
Chidan	0.88	0.88	0.88	33
Hieulenh	0.93	0.87	0.90	31
Nguyhiem	1.00	1.00	1.00	29
Phu	0.88	0.96	0.92	23
accuracy			0.93	149
macro avg	0.93	0.93	0.93	149

weighted avg      0.93      0.93      0.93      149

```
heatmap_label_knn = confusion_matrix(test_labels_encoded, y_pred_knn)

plt.figure(figsize=(10, 8))
sns.heatmap(heatmap_label_knn, annot=True, fmt='d', cmap='Blues',
            xticklabels=label_encoder.classes_, yticklabels=label_encoder.classes_)
plt.title('Confusion Matrix')
plt.xlabel('Predicted Labels')
plt.ylabel('True Labels')
plt.show()
```



```
n_columns = 10
n_rows = math.ceil(len(test_images) / n_columns)
```

```

fig, axes = plt.subplots(n_rows, n_columns, figsize=(30, n_rows * 3))

for idx, (image, true_label, pred_label) in enumerate(zip(test_images,
↳ test_labels_encoded, y_pred_knn)):
    row = idx // n_columns
    col = idx % n_columns

    axes[row, col].imshow(image)
    axes[row, col].set_title(f'True: {label_encoder.classes_[true_label]}\nPred:
↳ {label_encoder.classes_[pred_label]}')
    axes[row, col].axis('off')

for ax in axes.flat:
    if not ax.has_data():
        ax.axis('off')

plt.tight_layout()
plt.show()

```



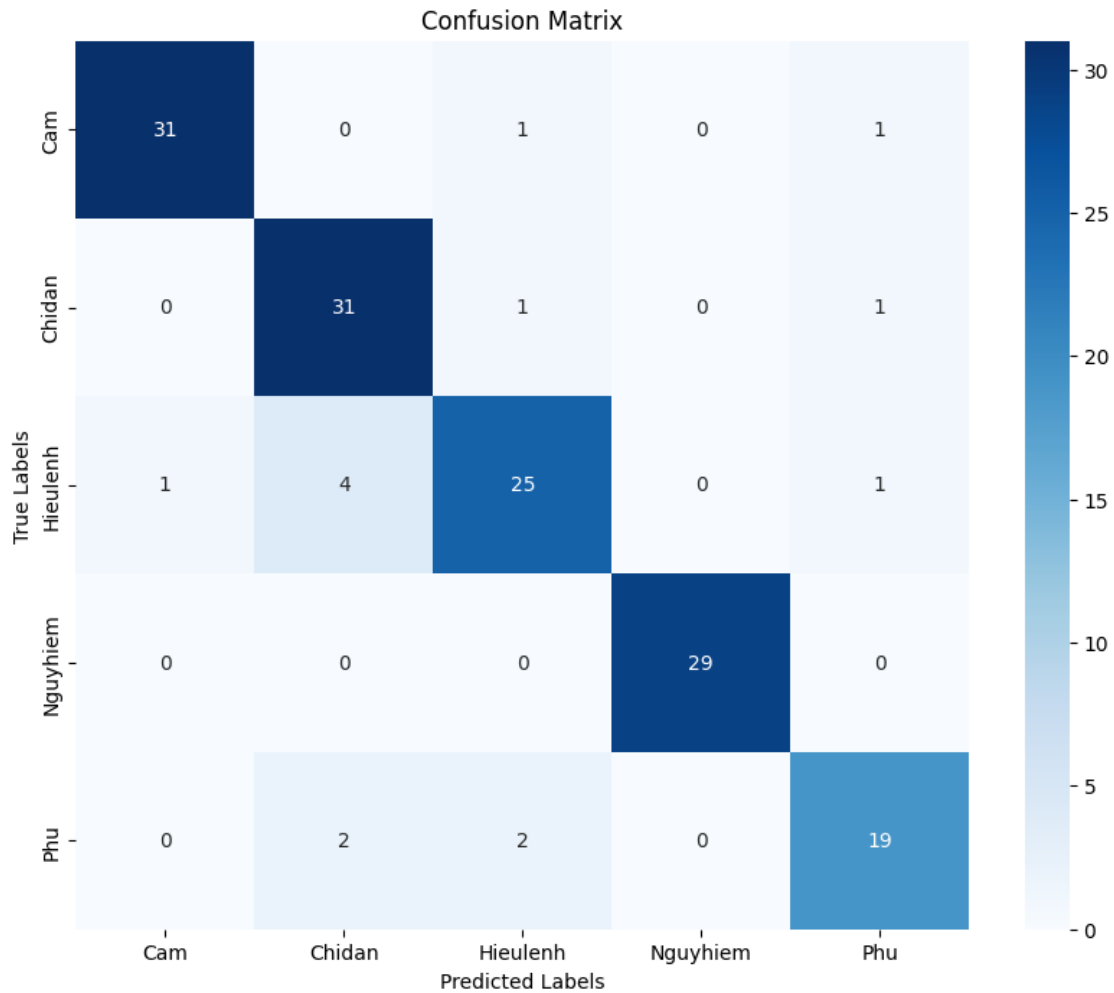
## 9 Predict on test images for SVM

```
report_svm = classification_report(test_labels_encoded, y_pred_svm,
    ↳target_names=label_encoder.classes_)
print(report_svm)
```

	precision	recall	f1-score	support
Cam	0.97	0.94	0.95	33
Chidan	0.84	0.94	0.89	33
Hieulenh	0.86	0.81	0.83	31
Nguyhiem	1.00	1.00	1.00	29
Phu	0.86	0.83	0.84	23
accuracy			0.91	149
macro avg	0.91	0.90	0.90	149
weighted avg	0.91	0.91	0.91	149

```
heatmap_label_svm = confusion_matrix(test_labels_encoded, y_pred_svm)

plt.figure(figsize=(10, 8))
sns.heatmap(heatmap_label_svm, annot=True, fmt='d', cmap='Blues',
    ↳xticklabels=label_encoder.classes_, yticklabels=label_encoder.classes_)
plt.title('Confusion Matrix')
plt.xlabel('Predicted Labels')
plt.ylabel('True Labels')
plt.show()
```



```

n_columns = 10
n_rows = math.ceil(len(test_images) / n_columns)

fig, axes = plt.subplots(n_rows, n_columns, figsize=(30, n_rows * 3))

for idx, (image, true_label, pred_label) in enumerate(zip(test_images,
    ↪ test_labels_encoded, y_pred_svm)):
    row = idx // n_columns
    col = idx % n_columns

    axes[row, col].imshow(image)
    axes[row, col].set_title(f'True: {label_encoder.classes_[true_label]}\nPred:
    ↪ {label_encoder.classes_[pred_label]}')
    axes[row, col].axis('off')

```



```

for ax in axes.flat:
    if not ax.has_data():
        ax.axis('off')

plt.tight_layout()
plt.show()

```

## 10 Save grid search results

```

def export_notebook_to_pdf(notebook_path, project_dir):
    results_dir = os.path.join(project_dir)
    os.makedirs(results_dir, exist_ok=True)

    # Đọc notebook
    with open(notebook_path, 'r', encoding='utf-8') as f:
        nb = nbformat.read(f, as_version=4)

    # Cấu hình PDF exporter
    pdf_exporter = PDFExporter()
    pdf_exporter.exclude_input_prompt = True
    pdf_exporter.exclude_output_prompt = True

    # Thêm template và style cơ bản
    pdf_exporter.template_name = 'classic'

    # Chuyển đổi sang PDF
    pdf_data, resources = pdf_exporter.from_notebook_node(nb)

    # Tạo tên file với timestamp
    current_time = datetime.now().strftime('%Y-%m-%d_%H_%M_%S')
    pdf_file = os.path.join(results_dir, f"notebook_export_{current_time}.pdf")

    # Lưu file PDF
    with open(pdf_file, 'wb') as f:
        f.write(pdf_data)

    print(f"Đã xuất file PDF thành công: {pdf_file}")
    return pdf_file

```

```

# project_dir = os.path.dirname(project_dir)
notebook_path = project_dir + "\\model\\main.ipynb"
proj_dir = project_dir + "\\grid_search_results"

export_notebook_to_pdf(notebook_path, proj_dir)

```

```

param_grid_KNN = { 'n_neighbors': [3, 4, 5, 6, 7, 10], 'weights': ['uniform', 'distance'],
'metric': [ cityblock, cosine, sqeuclidean, chi_square_distance, bhattacharyya_distance, intersec-

```

```
tion_distance ] }
```

```
Best Params: {'metric': , 'n_neighbors': 4, 'weights': 'distance'}
```

```
param_grid_SVC = { 'C': [0.1, 0.2, 0.3, 0.4],  
'kernel': ['rbf', 'linear', 'poly', 'sigmoid'], 'gamma': ['scale', 'auto', 0.1, 0.01, 0.001],  
'degree': [2, 3, 4],  
}
```

```
Best parameters: {'C': 0.1, 'degree': 4, 'gamma': 'scale', 'kernel': 'poly'}
```