

Spam Detection HW

Read complete instructions before starting the HW

Q1: Load the dataset (1 Point)

- For this Hw you will use spam dataset from kaggle which can be found from [this](#) link. You can download this data and either upload it in google drive or in colab workspace. Load the data in pandas dataframe.
- There are only two useful columns. These columns are related to (1) label (ham and spam) and the (2) text of email.
- Rename columns as label and message
- Find the % ham and spam in the data.

```
In [ ]: import sys
if 'google.colab' in str(get_ipython()):
    from google.colab import files

    uploaded = files.upload()

    for fn in uploaded.keys():
        print('User uploaded file "{name}" with length {length} bytes'.format(
            name=fn, length=len(uploaded[fn])))

    # Then move kaggle.json into the folder where the API expects to find it.

    !mkdir -p ~/.kaggle/ && mv kaggle.json ~/.kaggle/ && chmod 600 ~/.kaggle
    !kaggle datasets download "uciml/sms-spam-collection-dataset"
    !unzip sms-spam-collection-dataset.zip
```

```
In [ ]: import pandas as pd
if 'google.colab' in str(get_ipython()):
    spam_df = pd.read_csv('spam.csv', encoding='latin-1')
else:
    spam_df = pd.read_csv('/Users/harikrishnadev/Library/CloudStorage/Google
spam_df = spam_df[['v1', 'v2']]
spam_df.columns = ['label', 'message']
spam_df.head()
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/1337418617.py:1: DeprecationWarning:
Pyarrow will become a required dependency of pandas in the next major release of pandas (pandas 3.0),
(to allow more performant data types, such as the Arrow string type, and better interoperability with other libraries)
but was not found to be installed on your system.
If this would cause problems for you,
please provide us feedback at https://github.com/pandas-dev/pandas/issues/54466

import pandas as pd
```

```
Out[ ]:      label      message
0    ham  Go until jurong point, crazy.. Available only ...
1    ham                Ok lar... Joking wif u oni...
2  spam  Free entry in 2 a wkly comp to win FA Cup fina...
3    ham  U dun say so early hor... U c already then say...
4    ham  Nah I don't think he goes to usf, he lives aro...
```

```
In [ ]: spam_df['label'].value_counts()
```

```
Out[ ]: label
ham      4825
spam      747
Name: count, dtype: int64
```

```
In [ ]: spam_df['label'].value_counts(normalize=True)*100
```

```
Out[ ]: label
ham      86.593683
spam     13.406317
Name: proportion, dtype: float64
```

```
In [ ]: spam_df['label'].replace({'ham':0, 'spam':1}, inplace=True)
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/1359867004.py:1: FutureWarning: A value is trying to be set on a copy of a DataFrame or Series through chained assignment using an inplace method. The behavior will change in pandas 3.0. This inplace method will never work because the intermediate object on which we are setting values always behaves as a copy.
```

For example, when doing `df[col].method(value, inplace=True)`, try using `df.method({col: value}, inplace=True)` or `df[col] = df[col].method(value)` instead, to perform the operation inplace on the original object.

```
spam_df['label'].replace({'ham':0, 'spam':1}, inplace=True)
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/1359867004.py:1: FutureWarning: Downcasting behavior in `replace` is deprecated and will be removed in a future version. To retain the old behavior, explicitly call `result.infer_objects(copy=False)`. To opt-in to the future behavior, set `pd.set_option('future.no_silent_downcasting', True)`
spam_df['label'].replace({'ham':0, 'spam':1}, inplace=True)
```

```
In [ ]: spam_df['label'].value_counts(normalize=True)*100
```

```
Out[ ]: label
0      86.593683
1      13.406317
Name: proportion, dtype: float64
```

Q2 : Provide the metric for evaluating model (1 Point)

As you will notice, the data is highly imbalanced (most messages are labelled as ham and only few are labelled as spam). Always predicting ham will give us very good accuracy (close to 90%). So you need to choose a different metric.

Task: Provide the metric you will choose to evaluate your model. Explain why this is an appropriate metric for this case.

Using F1 Score for the minority class would help us. As it provides balance between Precision and recall. In this experiment, my trial with using recall led to decline in accuracy.

Q3 : Classification Pipelines (18 Points)

In the previous lectures you learned Data processing, Featurization such as CountVectorizer, TfidfVectorizer, and also Feature Engineering.

- You will now use following methods to create features which you can use in your model.

1. Sparse Embeddings (TF-IDF) (6 Points)
2. Feature Engineering (see examples below) (6 Points)
3. Sparse Embeddings (TF-IDF) + Feature Engineering (6 Points)

Approach:

***Use a smaller subset of dataset (e.g. 5-10 %) to evaluate the three pipelines . Based on your analysis (e.g. model score, learning curves) , choose one pipeline from the three. Provide your rationale for choosing the pipeline. Train only the final pipeline on randomly selected larger subset (e.g. 40%) of the data.**

Requirements:

1. You can use any ML model (Logistic Regression, XgBoost) for the classification. You will need to tune the **model for imbalanced dataset** (The link on XGBoost tutorial for imbalanced data: <https://machinelearningmastery.com/xgboost-for-imbalanced-classification/>).
2. For feature engineering, you can choose from the examples below. You do not have to use all of them. You can add other features as well. Think about what features can distinguish a spam from a regular email. Some examples :

Count of following (Words, characters, digits, exclamation marks, numbers, Nouns, ProperNouns, AUX, VERBS, Adjectives, named entities, spelling mistakes (see the link on how to get spelling mistakes <https://pypi.org/project/pyspellchecker/>).
3. For Sparse embeddings you will use **tfidf vectorization**. You need to choose appropriate parameters e.g. min_df, max_df, max_features, n-grams etc.).
4. Think carefully about the pre-processing you will do.

Tip: **Using GridSearch for hyperparameter tuning might take a lot of time. Try using RandomizedSearch.** You can also explore faster implementation of Gridsearch and RandomizedSearch in sklearn:

1. [Halving Grid Search](#)
2. [HalvingRandomSearchCV](#)

Required Submissions:

1. Submit two colab/jupyter notebooks

- (analysis with smaller subset and all three pipelines)
 - (analysis with bigger subset and only final pipeline)
2. Pdf version of the notebooks (HWs will not be graded if pdf version is not provided.)
 3. **The notebooks and pdf files should have the output.**
 4. **Name files as follows : FirstName_file1_hw2, FirstName_file2_h2**

```
In [ ]: spam_df_small = spam_df.sample(frac=0.05).reset_index(drop=True)
spam_df_small.head()
```

```
Out[ ]:   label      message
0      0  Good afternoon, my love. How goes your day ? W...
1      0  There's no point hangin on to mr not right if ...
2      1  u r subscribed 2 TEXTCOMP 250 wkly comp. 1st w...
3      0  I though we shd go out n have some fun so bar ...
4      0  I thk 50 shd be ok he said plus minus 10.. Did...
```

```
In [ ]: spam_df_small['label'].value_counts(normalize=True)*100
```

```
Out[ ]: label
0      87.81362
1     12.18638
Name: proportion, dtype: float64
```

`df.sample` was able to create a stratified sample without specifying. If this wasn't the case I would try using methods mention in this [article](#).

```
In [ ]: import sklearn
from sklearn.model_selection import train_test_split
X = spam_df_small['message'].values
y = spam_df_small['label'].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, stratify=y)
print(X_train[:5])
print(y_train[:5])
print(X_test[:5])
print(y_test[:5])
```

```
['\HELLO U.CALL WEN U FINISH WRK.I FANCY MEETIN UP WIV U ALL TONITE AS I NE
ED A BREAK FROM DABOOKS. DID 4 HRS LAST NITE+2 TODAY OF WRK!\\'']
'Abeg, make profit. But its a start. Are you using it to get sponsors for t
he next event?'
'I sent them. Do you like?'
'Your free ringtone is waiting to be collected. Simply text the password
\MIX\' to 85069 to verify. Get Usher and Britney. FML'
'Play w computer? Aiyah i tok 2 u lor?']
[0 0 0 1 0]
['No b4 Thursday']
'So many people seems to be special at first sight, But only very few will
remain special to you till your last sight.. Maintain them till life ends..
Sh!jas'
'Like I made him throw up when we were smoking in our friend's car one tim
e, it was awesome'
'Mmm thats better now i got a roast down me! iãd b better if i had a few d
rinks down me 2! Good indian?'
'HI DARLIN IM MISSIN U HOPE YOU ARE HAVING A GOOD TIME. WHEN ARE U BACK AND
WHAT TIME IF U CAN GIVE ME A CALL AT HOME. JESS XX']
[0 0 0 0 0]
```

```
In [ ]: import sys
if 'google.colab' in str(get_ipython()):
    from google.colab import drive
    drive.mount('/content/drive')

    !pip install -U nltk -qq
    !pip install -U spacy -qq
    !pip install -U scikit-optimize -qq
    !python -m spacy download en_core_web_sm -qq
    !pip install pyspellchecker -qq
    !pip install optuna -qq

    basepath = '/content/drive/MyDrive/Colab_Notebooks/BUAN_6342_Applied_Nat
sys.path.append('/content/drive/MyDrive/Colab_Notebooks/BUAN_6342_Applie
else:
    basepath = '/Users/harikrishnadev/Library/CloudStorage/GoogleDrive-harik
sys.path.append(
    '/Users/harikrishnadev/Library/CloudStorage/GoogleDrive-harikrish060
```

```
In [ ]: from pathlib import Path
base_folder = Path(basepath)
data_folder = base_folder/'_Data_Folder'
model_folder = base_folder/'models/spam'
custom_functions = base_folder/'custom-functions'
```

```
In [ ]: import CustomPreprocessorSpacy as cp
from FeaturizerSpacy_w_SpellChecker import ManualFeatures
from plot_learning_curve import plot_learning_curve
```

```
In [ ]: import spacy
nlp = spacy.load('en_core_web_sm')
```

```
In [ ]: disabled = nlp.select_pipes(
        disable=['tok2vec', 'tagger', 'parser', 'attribute_ruler', 'lemmatizer',
```

```
def spacy_tokenizer(data):
    doc = nlp(data)
    return [token.text for token in doc]
```

```
In [ ]: cpp = cp.SpacyPreprocessor(model = 'en_core_web_sm', batch_size=500)
```

```
def spacy_preprocessor(data):
    text = cpp.transform(data)
    return " ".join(text)
```

```
In [ ]: X_train_cleaned_bow = cpp.transform(X_train)
X_test_cleaned_bow = cpp.transform(X_test)
```

/Users/harikrishnadev/Library/CloudStorage/GoogleDrive-harikrish0607@gmail.com/My Drive/Colab_Notebooks/BUAN_6342_Applied_Natural_Language_Processing/0_Custom_files/CustomPreprocessorSpacy.py:83: MarkupResemblesLocatorWarning: The input looks more like a filename than markup. You may want to open this file and pass the filehandle into BeautifulSoup.

```
soup = BeautifulSoup(text, "html.parser")
```

```
In [ ]: # Import the joblib library for saving and loading models
import joblib
import os

file_X_train_cleaned_bow = data_folder / 'x_train_cleaned_bow_small.pkl'
os.makedirs(os.path.dirname(file_X_train_cleaned_bow), exist_ok=True)
joblib.dump(X_train_cleaned_bow, file_X_train_cleaned_bow)

file_X_test_cleaned_bow = data_folder / 'x_test_cleaned_bow_small.pkl'
os.makedirs(os.path.dirname(file_X_test_cleaned_bow), exist_ok=True)
joblib.dump(X_test_cleaned_bow, file_X_test_cleaned_bow)
```

```
Out[ ]: ['/Users/harikrishnadev/Library/CloudStorage/GoogleDrive-harikrish0607@gmail.com/My Drive/Colab_Notebooks/BUAN_6342_Applied_Natural_Language_Processing/0_Data_Folder/x_test_cleaned_bow_small.pkl']
```

```
In [ ]: import numpy as np
unique, counts = np.unique(y_train, return_counts=True)
print(dict(zip(unique, counts/sum(counts))))

{0: 0.8789237668161435, 1: 0.1210762331838565}
```

```
In [ ]: weights = dict(zip(unique[::-1], counts/sum(counts)))
weights
```

```
Out[ ]: {1: 0.8789237668161435, 0: 0.1210762331838565}
```

Sparse Embeddings

```
In [ ]: import optuna
from sklearn.model_selection import cross_val_score
from sklearn.feature_extraction.text import TfidfVectorizer
```

```

from sklearn.linear_model import LogisticRegression
from sklearn.pipeline import Pipeline
from sklearn.metrics import make_scorer, f1_score, recall_score, precision_s

def objective(trial):
    # Define the hyperparameters to search over
    max_features = trial.suggest_int('max_features', 100, 10000)
    C = trial.suggest_loguniform('C', 1e-5, 100)
    weight = trial.suggest_float('weight', 0.1, 0.9)

    class_weight = {0: 1 - weight, 1: weight}

    # Create a pipeline with the current set of hyperparameters
    classifier_1 = Pipeline([
        ('vectorizer', TfidfVectorizer(analyzer='word', token_pattern=r"[\S]
        ('classifier', LogisticRegression(max_iter=10000, C=C, class_weight=
    ])

    # Use cross-validation to evaluate the classifier with the current hyper
    # Use f1_score as the scoring metric
    scores = cross_val_score(classifier_1, X_train, y_train, cv=5, scoring='f1')
    return scores.mean()

```

```

/opt/homebrew/anaconda3/envs/nlp/lib/python3.11/site-packages/tqdm/auto.py:2
1: TqdmWarning: IProgress not found. Please update jupyter and ipywidgets. S
ee https://ipywidgets.readthedocs.io/en/stable/user_install.html
from .autonotebook import tqdm as notebook_tqdm

```

```

In [ ]: study = optuna.create_study(direction='maximize')
study.optimize(objective, n_trials=100)

```



```

[I 2024-02-10 23:08:31,822] A new study created in memory with name: no-name
-5a16edf9-5b7b-455e-b4e3-161d7d7b954f
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:31,876] Trial 0 finished with value: 0.0 and parameters:
{'max_features': 2476, 'C': 3.8921654582684453, 'weight': 0.549451448517344
3}. Best is trial 0 with value: 0.0.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:31,924] Trial 1 finished with value: 0.0 and parameters:
{'max_features': 8191, 'C': 8.519509734421042e-05, 'weight': 0.3315920018226
065}. Best is trial 0 with value: 0.0.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:31,964] Trial 2 finished with value: 0.0 and parameters:
{'max_features': 9292, 'C': 0.09175637103517915, 'weight': 0.288487410414817
5}. Best is trial 0 with value: 0.0.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,010] Trial 3 finished with value: 0.24761904761904763
and parameters: {'max_features': 3867, 'C': 4.006492935614388, 'weight': 0.6
74061161275147}. Best is trial 3 with value: 0.24761904761904763.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,056] Trial 4 finished with value: 0.0 and parameters:
{'max_features': 950, 'C': 0.0003041536862666951, 'weight': 0.42605940865926
706}. Best is trial 3 with value: 0.24761904761904763.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,103] Trial 5 finished with value: 0.45999999999999996
and parameters: {'max_features': 723, 'C': 25.89610640961438, 'weight': 0.28
91556060132602}. Best is trial 5 with value: 0.45999999999999996.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,158] Trial 6 finished with value: 0.7779220779220779

```

```
and parameters: {'max_features': 7241, 'C': 42.84264067041149, 'weight': 0.7
193900354414825}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,202] Trial 7 finished with value: 0.0 and parameters:
{'max_features': 654, 'C': 2.4168385869434722e-05, 'weight': 0.2860332861089
4063}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,245] Trial 8 finished with value: 0.0 and parameters:
{'max_features': 1798, 'C': 3.744743793705783e-05, 'weight': 0.8351753526084
889}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,284] Trial 9 finished with value: 0.0 and parameters:
{'max_features': 1816, 'C': 0.0043737472481470314, 'weight': 0.8387966108639
938}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,335] Trial 10 finished with value: 0.0 and parameter
s: {'max_features': 6372, 'C': 0.16181061444037484, 'weight': 0.108636281238
2835}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,392] Trial 11 finished with value: 0.7422077922077921
and parameters: {'max_features': 6299, 'C': 38.33873854584034, 'weight': 0.5
939320814273596}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,450] Trial 12 finished with value: 0.7779220779220779
and parameters: {'max_features': 6165, 'C': 66.19714280442518, 'weight': 0.6
698691126121801}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,506] Trial 13 finished with value: 0.7779220779220779
```

```
and parameters: {'max_features': 6747, 'C': 94.71589627314549, 'weight': 0.6
810524429094758}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,553] Trial 14 finished with value: 0.0 and parameter
s: {'max_features': 4030, 'C': 1.5440168273369266, 'weight': 0.7425448401011
934}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,600] Trial 15 finished with value: 0.5021260221260221
and parameters: {'max_features': 7853, 'C': 0.5903962509110549, 'weight': 0.
8947233669927717}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,648] Trial 16 finished with value: 0.0 and parameter
s: {'max_features': 5072, 'C': 0.005434105523320505, 'weight': 0.75484179954
1067}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,705] Trial 17 finished with value: 0.4599999999999999
6 and parameters: {'max_features': 9736, 'C': 15.695341764284864, 'weight':
0.45087952820630933}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,759] Trial 18 finished with value: 0.4333333333333333
and parameters: {'max_features': 7793, 'C': 6.290638582029828, 'weight': 0.6
057617623971517}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,810] Trial 19 finished with value: 0.0 and parameter
s: {'max_features': 5146, 'C': 0.012728243726873431, 'weight': 0.66876957185
80122}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,860] Trial 20 finished with value: 0.0 and parameter
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s: {'max_features': 8844, 'C': 0.5449539009675118, 'weight': 0.5143970371868505}. Best is trial 6 with value: 0.7779220779220779.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,921] Trial 21 finished with value: 0.8136363636363637 and parameters: {'max_features': 6535, 'C': 86.85968731553228, 'weight': 0.7223859779796933}. Best is trial 21 with value: 0.8136363636363637.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:32,984] Trial 22 finished with value: 0.8414141414141415 and parameters: {'max_features': 7131, 'C': 55.13512210788287, 'weight': 0.7603399740971155}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,048] Trial 23 finished with value: 0.8414141414141415 and parameters: {'max_features': 7348, 'C': 95.20465604458447, 'weight': 0.7810263350711478}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,109] Trial 24 finished with value: 0.8136363636363637 and parameters: {'max_features': 5606, 'C': 10.724638729321496, 'weight': 0.8074571739223753}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,161] Trial 25 finished with value: 0.7615384615384615 and parameters: {'max_features': 8550, 'C': 1.7925578363666743, 'weight': 0.8999623441144986}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,223] Trial 26 finished with value: 0.8414141414141415 and parameters: {'max_features': 3944, 'C': 83.62123984058353, 'weight': 0.8009942021511018}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,284] Trial 27 finished with value: 0.8136363636363637
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and parameters: {'max_features': 3982, 'C': 14.747125989669309, 'weight': 0.7977761474990664}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,338] Trial 28 finished with value: 0.0 and parameters: {'max_features': 2886, 'C': 1.0464504614810914, 'weight': 0.6213149573044026}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,388] Trial 29 finished with value: 0.0 and parameters: {'max_features': 4389, 'C': 0.0007282571891177424, 'weight': 0.7825918831810894}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,441] Trial 30 finished with value: 0.19047619047619047 and parameters: {'max_features': 2817, 'C': 5.815544749503557, 'weight': 0.5579689607726369}. Best is trial 22 with value: 0.8414141414141415.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,494] Trial 31 finished with value: 0.8691919191919192 and parameters: {'max_features': 6948, 'C': 76.68898786614541, 'weight': 0.8599259280257776}. Best is trial 31 with value: 0.8691919191919192.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,546] Trial 32 finished with value: 0.8691919191919192 and parameters: {'max_features': 7088, 'C': 24.631476811277686, 'weight': 0.8571502008666536}. Best is trial 31 with value: 0.8691919191919192.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,603] Trial 33 finished with value: 0.8691919191919192 and parameters: {'max_features': 7302, 'C': 22.981123044899377, 'weight': 0.8645389653195866}. Best is trial 31 with value: 0.8691919191919192.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,653] Trial 34 finished with value: 0.8818181818181818
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and parameters: {'max_features': 7103, 'C': 2.7089241002219673, 'weight': 0.8778668934149352}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,701] Trial 35 finished with value: 0.0 and parameters: {'max_features': 5711, 'C': 0.1678220214017634, 'weight': 0.8626088743436221}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,751] Trial 36 finished with value: 0.8414141414141415 and parameters: {'max_features': 8038, 'C': 3.127997700383461, 'weight': 0.8628869621183565}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,802] Trial 37 finished with value: 0.8691919191919192 and parameters: {'max_features': 9118, 'C': 19.16835296146711, 'weight': 0.8559205425426222}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,853] Trial 38 finished with value: 0.0 and parameters: {'max_features': 8470, 'C': 0.04607889479192202, 'weight': 0.14795911035047843}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:33,912] Trial 39 finished with value: 0.8136363636363637 and parameters: {'max_features': 7367, 'C': 5.964951060824025, 'weight': 0.8249902968479513}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,013] Trial 40 finished with value: 0.8818181818181818 and parameters: {'max_features': 5690, 'C': 21.11473487456487, 'weight': 0.8993688765091211}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,079] Trial 41 finished with value: 0.8818181818181818
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and parameters: {'max_features': 6982, 'C': 25.842981190427704, 'weight': 0.895662617384496}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,134] Trial 42 finished with value: 0.8818181818181818 and parameters: {'max_features': 5772, 'C': 9.176658001280822, 'weight': 0.8805236197500543}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,191] Trial 43 finished with value: 0.8569696969696969 and parameters: {'max_features': 5656, 'C': 8.178860476768577, 'weight': 0.8997801951872683}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,246] Trial 44 finished with value: 0.8484848484848484 and parameters: {'max_features': 6095, 'C': 3.125625472373995, 'weight': 0.8988537831199681}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,307] Trial 45 finished with value: 0.8691919191919192 and parameters: {'max_features': 4831, 'C': 32.94852004806848, 'weight': 0.8411426662005764}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,356] Trial 46 finished with value: 0.0 and parameters: {'max_features': 6730, 'C': 0.5703905672009154, 'weight': 0.7201182947627922}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,411] Trial 47 finished with value: 0.45999999999999996 and parameters: {'max_features': 5989, 'C': 2.442684334597523, 'weight': 0.8156038847160165}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,460] Trial 48 finished with value: 0.0 and parameter

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s: {'max_features': 6723, 'C': 0.21328161674682208, 'weight': 0.316074035406
64836}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,521] Trial 49 finished with value: 0.8414141414141415
and parameters: {'max_features': 4738, 'C': 36.42733330522051, 'weight': 0.7
721324809820449}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,580] Trial 50 finished with value: 0.3999999999999999
7 and parameters: {'max_features': 5138, 'C': 15.331924831943466, 'weight':
0.3592826302233286}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,636] Trial 51 finished with value: 0.8691919191919192
and parameters: {'max_features': 7052, 'C': 30.33399282872651, 'weight': 0.8
664725464611243}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,696] Trial 52 finished with value: 0.8414141414141415
and parameters: {'max_features': 7648, 'C': 10.575737936446993, 'weight': 0.
8304549655962981}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,754] Trial 53 finished with value: 0.8540404040404042
and parameters: {'max_features': 5488, 'C': 48.51861974433064, 'weight': 0.8
746746463150438}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,806] Trial 54 finished with value: 0.1333333333333333
3 and parameters: {'max_features': 6347, 'C': 0.9826835969845874, 'weight':
0.8281053538997948}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,858] Trial 55 finished with value: 0.8818181818181818
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and parameters: {'max_features': 7608, 'C': 5.548414213907934, 'weight': 0.8
782569317663655}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,913] Trial 56 finished with value: 0.4599999999999999
6 and parameters: {'max_features': 8208, 'C': 5.51123437115329, 'weight':
0.6927149135460124}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:34,966] Trial 57 finished with value: 0.0 and parameter
s: {'max_features': 5934, 'C': 3.5936304195203133, 'weight': 0.2404159087587
1816}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,020] Trial 58 finished with value: 0.0 and parameter
s: {'max_features': 7720, 'C': 1.3504080586073857e-05, 'weight': 0.744980387
9769463}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,071] Trial 59 finished with value: 0.1216326530612244
8 and parameters: {'max_features': 3380, 'C': 0.0003671066124270534, 'weigh
t': 0.8808229840814742}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,123] Trial 60 finished with value: 0.1333333333333333
3 and parameters: {'max_features': 6786, 'C': 1.4425863647324149, 'weight':
0.8016867736486648}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,181] Trial 61 finished with value: 0.8414141414141415
and parameters: {'max_features': 6961, 'C': 10.318390593200936, 'weight': 0.
8419197707589869}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,237] Trial 62 finished with value: 0.8818181818181818
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and parameters: {'max_features': 6472, 'C': 20.688333873615466, 'weight': 0.8804866781101516}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,297] Trial 63 finished with value: 0.8540404040404042 and parameters: {'max_features': 6425, 'C': 52.91954973945353, 'weight': 0.8859989061600198}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,359] Trial 64 finished with value: 0.8414141414141415 and parameters: {'max_features': 7563, 'C': 16.332298874604184, 'weight': 0.8390750338780546}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,410] Trial 65 finished with value: 0.0 and parameters: {'max_features': 5307, 'C': 0.3526141897217177, 'weight': 0.7871828887278762}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,461] Trial 66 finished with value: 0.8050505050505052 and parameters: {'max_features': 267, 'C': 57.356781548932176, 'weight': 0.8988075347357515}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,524] Trial 67 finished with value: 0.8136363636363637 and parameters: {'max_features': 8169, 'C': 8.864144480142919, 'weight': 0.8098095116468469}. Best is trial 34 with value: 0.8818181818181818.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,576] Trial 68 finished with value: 0.8969696969696969 and parameters: {'max_features': 5865, 'C': 4.08525761456645, 'weight': 0.8735645566660062}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,633] Trial 69 finished with value: 0.0 and parameter

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s: {'max_features': 4448, 'C': 4.712517284700244, 'weight': 0.46730381893522
62}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,683] Trial 70 finished with value: 0.1333333333333333
3 and parameters: {'max_features': 6516, 'C': 2.1546612546599238, 'weight':
0.7391101539090685}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,740] Trial 71 finished with value: 0.8540404040404042
and parameters: {'max_features': 5761, 'C': 21.700559304315004, 'weight': 0.
8730020752182825}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,796] Trial 72 finished with value: 0.8691919191919192
and parameters: {'max_features': 6091, 'C': 13.153159343385692, 'weight': 0.
8498746694093607}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,854] Trial 73 finished with value: 0.8540404040404042
and parameters: {'max_features': 5367, 'C': 34.78451105576151, 'weight': 0.8
718037325283874}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,918] Trial 74 finished with value: 0.8414141414141415
and parameters: {'max_features': 7457, 'C': 91.32380303827793, 'weight': 0.8
197811219332116}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:35,975] Trial 75 finished with value: 0.8414141414141415
and parameters: {'max_features': 6242, 'C': 7.350972758453487, 'weight': 0.8
520919499882816}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,028] Trial 76 finished with value: 0.0 and parameter

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s: {'max_features': 6892, 'C': 0.8765526059872906, 'weight': 0.7764699288856085}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,079] Trial 77 finished with value: 0.12163265306122448 and parameters: {'max_features': 7990, 'C': 0.0024247256054627216, 'weight': 0.8797763717438692}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,135] Trial 78 finished with value: 0.8484848484848484 and parameters: {'max_features': 6572, 'C': 3.7836445786300557, 'weight': 0.898942707917826}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,190] Trial 79 finished with value: 0.0 and parameters: {'max_features': 5861, 'C': 8.538650501703321e-05, 'weight': 0.7637184851690486}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,253] Trial 80 finished with value: 0.8414141414141415 and parameters: {'max_features': 1368, 'C': 25.50665828047232, 'weight': 0.8007489580316813}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,314] Trial 81 finished with value: 0.8691919191919192 and parameters: {'max_features': 7105, 'C': 22.535585426327717, 'weight': 0.8481615809267455}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,371] Trial 82 finished with value: 0.8691919191919192 and parameters: {'max_features': 7193, 'C': 63.792889987885495, 'weight': 0.8565927749607846}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,438] Trial 83 finished with value: 0.8414141414141415
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and parameters: {'max_features': 6233, 'C': 12.896656188904487, 'weight': 0.8268382086127173}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,497] Trial 84 finished with value: 0.8540404040404042 and parameters: {'max_features': 8540, 'C': 37.23182475782217, 'weight': 0.8808834157453107}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,549] Trial 85 finished with value: 0.0 and parameters: {'max_features': 4828, 'C': 0.02252310945139668, 'weight': 0.8557728983745081}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,606] Trial 86 finished with value: 0.45999999999999996 and parameters: {'max_features': 6633, 'C': 7.910213710627018, 'weight': 0.6355731677346573}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,661] Trial 87 finished with value: 0.5076190476190476 and parameters: {'max_features': 6930, 'C': 2.413375030551584, 'weight': 0.8228157925858361}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,721] Trial 88 finished with value: 0.8818181818181818 and parameters: {'max_features': 7322, 'C': 17.850872761232544, 'weight': 0.8819930437209158}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,776] Trial 89 finished with value: 0.8818181818181818 and parameters: {'max_features': 7796, 'C': 5.224967740464941, 'weight': 0.8832651922843835}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,828] Trial 90 finished with value: 0.8791919191919192
```

```

and parameters: {'max_features': 9165, 'C': 1.3033029796744144, 'weight': 0.
8793396825816969}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,883] Trial 91 finished with value: 0.8424242424242424
and parameters: {'max_features': 9971, 'C': 1.6111357246828657, 'weight': 0.
8841804271513739}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,941] Trial 92 finished with value: 0.8640404040404042
and parameters: {'max_features': 7835, 'C': 4.32644560418139, 'weight': 0.88
39296117381557}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:36,999] Trial 93 finished with value: 0.7779220779220779
and parameters: {'max_features': 9276, 'C': 2.8816177289204554, 'weight': 0.
842123671064082}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:37,058] Trial 94 finished with value: 0.856969696969697
and parameters: {'max_features': 9051, 'C': 5.408160602440342, 'weight': 0.8
984364900065213}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:37,112] Trial 95 finished with value: 0.8969696969696969
and parameters: {'max_features': 9621, 'C': 1.3517769723445567, 'weight': 0.
8768446482702812}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:37,162] Trial 96 finished with value: 0.0 and parameter
s: {'max_features': 7520, 'C': 0.08944473927841032, 'weight': 0.867583846509
8495}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:37,214] Trial 97 finished with value: 0.0 and parameter

```

```
s: {'max_features': 9737, 'C': 0.37417050536783664, 'weight': 0.814708845071
1052}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:37,280] Trial 98 finished with value: 0.8136363636363637
and parameters: {'max_features': 8263, 'C': 15.563943354690853, 'weight': 0.
7872999846474028}. Best is trial 68 with value: 0.8969696969696969.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/3743568161.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:08:37,342] Trial 99 finished with value: 0.1333333333333333
3 and parameters: {'max_features': 5521, 'C': 10.20599736990684, 'weight':
0.3804324559004176}. Best is trial 68 with value: 0.8969696969696969.
```

```
In [ ]: # Get the best hyperparameters found by Optuna
best_max_features = study.best_params['max_features']
best_C = study.best_params['C']
best_weight = study.best_params['weight']
```

```
In [ ]: study.best_params
```

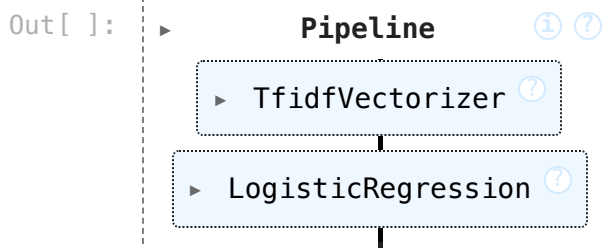
```
Out[ ]: {'max_features': 5865, 'C': 4.08525761456645, 'weight': 0.8735645566660062}
```

```
In [ ]: study.best_value
```

```
Out[ ]: 0.8969696969696969
```

```
In [ ]: best_classifier_1 = Pipeline([
    ('vectorizer', TfidfVectorizer(analyzer='word', token_pattern=r"[\S]+",
    ('classifier', LogisticRegression(max_iter=10000, C=best_C, class_weight=
```

```
In [ ]: best_classifier_1.fit(X_train_cleaned_bow, y_train)
```



```
In [ ]: print(f'Best cross-validation score: {study.best_value:.2f}')
print("\nBest parameters: ", study.best_params)
print("\nBest estimator: ", best_classifier_1)
```

Best cross-validation score: 0.90

Best parameters: {'max_features': 5865, 'C': 4.08525761456645, 'weight': 0.8735645566660062}

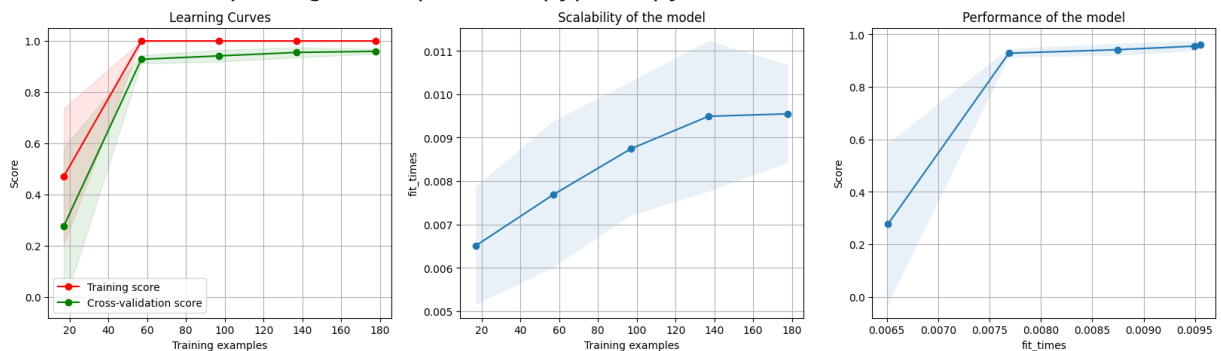
Best estimator: Pipeline(steps=[('vectorizer',
TfidfVectorizer(max_features=5865, token_pattern='[\\S]
+')),
('classifier',
LogisticRegression(C=4.08525761456645,
class_weight={0: 0.1264354433339938,
1: 0.8735645566660062},
max_iter=10000))])

```
In [ ]: study.__dict__
```

```
Out[ ]: {'study_name': 'no-name-5a16edf9-5b7b-455e-b4e3-161d7d7b954f',  
 '_study_id': 0,  
 '_storage': <optuna.storages._in_memory.InMemoryStorage at 0x2a15a54d0>,  
 '_directions': [<StudyDirection.MAXIMIZE: 2>],  
 '_sampler': <optuna.samplers._tpe.sampler.TPESampler at 0x2a00033d0>,  
 '_pruner': <optuna.pruners._median.MedianPruner at 0x2a155ec50>,  
 '_thread_local': <optuna.study.study._ThreadLocalStudyAttribute at 0x2a175  
 26f0>,  
 '_stop_flag': False}
```

```
In [ ]: plot_learning_curve(best_classifier_1, 'Learning Curves',  
 X_train_cleaned_bow, y_train, n_jobs=-1)
```

```
Out[ ]: <module 'matplotlib.pyplot' from '/opt/homebrew/anaconda3/envs/nlp/lib/pyth  
on3.11/site-packages/matplotlib/pyplot.py'>
```



```
In [ ]: def final_pipeline(pipeline, cleaned_text):  
         predictions = pipeline.predict(cleaned_text)  
         return predictions  
y_test_pred = final_pipeline(best_classifier_1, X_test_cleaned_bow)
```

```
In [ ]: import sklearn.metrics as metrics  
print('\nTest set classification report:\n\n',  
      metrics.classification_report(y_test, y_test_pred))
```


Test set classification report:

	precision	recall	f1-score	support
0	0.96	1.00	0.98	49
1	1.00	0.71	0.83	7
accuracy			0.96	56
macro avg	0.98	0.86	0.91	56
weighted avg	0.97	0.96	0.96	56

Feature Engineering

```
In [ ]: X_train_cleaned_basic = cp.SpacyPreprocessor(model='en_core_web_sm',  
                                                    lemmatize=False, lower=F  
                                                    remove_stop=False, remov  
                                                    remove_email=False, remc  
                                                    add_user_mention_prefix  
                                                    basic_clean_only=True).
```

/Users/harikrishnadev/Library/CloudStorage/GoogleDrive-harikrish0607@gmail.c
om/My Drive/Colab_Notebooks/BUAN_6342_Applied_Natural_Language_Processing/0_
Custom_files/CustomPreprocessorSpacy.py:83: MarkupResemblesLocatorWarning: T
he input looks more like a filename than markup. You may want to open this f
ile and pass the filehandle into BeautifulSoup.
soup = BeautifulSoup(text, "html.parser")

```
In [ ]: # save this to a file  
file_X_train_cleaned_basic = data_folder / 'x_train_cleaned_basic_small.pkl'  
joblib.dump(X_train_cleaned_basic, file_X_train_cleaned_basic)
```

```
Out [ ]: ['/Users/harikrishnadev/Library/CloudStorage/GoogleDrive-harikrish0607@gmai  
l.com/My Drive/Colab_Notebooks/BUAN_6342_Applied_Natural_Language_Processin  
g/0_Data_Folder/x_train_cleaned_basic_small.pkl']
```

```
In [ ]: X_test_cleaned_basic = cp.SpacyPreprocessor(model='en_core_web_sm',  
                                                    lemmatize=False, lower=F  
                                                    remove_stop=False, remov  
                                                    remove_email=False, remc  
                                                    add_user_mention_prefix  
                                                    basic_clean_only=True).  
file_X_test_cleaned_basic = data_folder / 'x_test_cleaned_basic_small.pkl'  
joblib.dump(X_test_cleaned_basic, file_X_test_cleaned_basic)
```

```
Out [ ]: ['/Users/harikrishnadev/Library/CloudStorage/GoogleDrive-harikrish0607@gmai  
l.com/My Drive/Colab_Notebooks/BUAN_6342_Applied_Natural_Language_Processin  
g/0_Data_Folder/x_test_cleaned_basic_small.pkl']
```

```
In [ ]: featurizer = ManualFeatures(spacy_model='en_core_web_sm', batch_size = 1000)
```

```
In [ ]: ManualFeatures??
```

Init signature:

```
ManualFeatures(  
    spacy_model,  
    batch_size=64,  
    pos_features=True,  
    ner_features=True,  
    text_descriptive_features=True,  
    spell_check=True,  
)
```

Source:

```
class ManualFeatures(TransformerMixin, BaseEstimator):
```

```
    """
```

A custom transformer that extracts manual features from text using spaCy. It integrates well into scikit-learn pipelines and offers a variety of text features including Part-of-Speech (POS) tags, Named Entity Recognition (NER) tags, and basic text descriptive statistics.

Attributes:

spacy_model (str): The spaCy language model to be used for tokenization and other NLP tasks.
batch_size (int): The number of documents to process at once during spaCy's pipeline processing.
pos_features (bool): If True, extract POS tag features.
ner_features (bool): If True, extract NER tag features.
text_descriptive_features (bool): If True, extract basic text descriptive features such as word count, character count, etc.

Methods:

get_cores() -> int:
Determines the number of CPU cores to utilize for parallel processing, aiming to optimize performance.

get_pos_features(cleaned_text: list) -> numpy.ndarray:
Extracts POS tag features from the text, counting the occurrences of nouns, auxiliary verbs, main verbs, and adjectives.

get_ner_features(cleaned_text: list) -> numpy.ndarray:
Extracts NER tag features from the text, counting the occurrences of named entities.

get_text_descriptive_features(cleaned_text: list) -> numpy.ndarray:
Extracts basic text descriptive features such as total word count, character count (with and without spaces), average word length, digit count, number count, and sentence count.

fit(X, y=None) -> 'ManualFeatures':
Fits the transformer to the data. This is a dummy method for scikit-learn compatibility and does not change the state of the object.

transform(X, y=None) -> tuple:
Transforms the provided data using the defined feature extraction methods. It returns a tuple containing a 2D numpy array of the extracted features and a list of feature names.

```

    Raises:
        TypeError: If the input X is not a list or a numpy array.
        Exception: For other exceptions that may occur during the transform
process.
    """

    def __init__(self, spacy_model, batch_size = 64, pos_features = True, ne
r_features = True, text_descriptive_features = True, spell_check=True):

        self.spacy_model = spacy_model
        self.batch_size = batch_size
        self.pos_features = pos_features
        self.ner_features = ner_features
        self.text_descriptive_features = text_descriptive_features
        self.spell_check = spell_check
        self.spell_checker = SpellChecker()

    def get_cores(self):
        """
        Get the number of CPU cores to use in parallel processing.
        """
        # Get the number of CPU cores available on the system.
        num_cores = os.cpu_count()
        if num_cores < 3:
            use_cores = 1
        else:
            use_cores = num_cores // 2 + 1
        return num_cores

    def get_pos_features(self, cleaned_text):

        nlp = spacy.load(self.spacy_model)
        noun_count = []
        aux_count = []
        verb_count = []
        adj_count =[]

        # Disable the lemmatizer and NER pipelines for improved performance
        disabled_pipes = ['lemmatizer', 'ner']
        with nlp.select_pipes(disable=disabled_pipes):
            n_process = self.get_cores()
            for doc in nlp.pipe(cleaned_text, batch_size=self.batch_size, n_
process=n_process):
                # Extract nouns, auxiliaries, verbs, and adjectives from the
document
                nouns = [token.text for token in doc if token.pos_ in ["NOU
N","PROPN"]]
                auxs = [token.text for token in doc if token.pos_ in ["AU
X"]]
                verbs = [token.text for token in doc if token.pos_ in ["VER
B"]]
                adjectives = [token.text for token in doc if token.pos_ in
["ADJ"]]

```

```

        # Store the count of each type of word in separate lists
        noun_count.append(len(nouns))
        aux_count.append(len(auxs))
        verb_count.append(len(verbs))
        adj_count.append(len(adjectives))

    # Stack the count lists vertically to form a 2D numpy array
    return np.transpose(np.vstack((noun_count, aux_count, verb_count, adj_count)))

def get_ner_features(self, cleaned_text):
    nlp = spacy.load(self.spacy_model)
    count_ner = []

    # Disable the tok2vec, tagger, parser, attribute ruler, and lemmatizer pipelines for improved performance
    disabled_pipes = ['tok2vec', 'tagger', 'parser', 'attribute_ruler', 'lemmatizer']
    with nlp.select_pipes(disable=disabled_pipes):
        n_process = self.get_cores()
        for doc in nlp.pipe(cleaned_text, batch_size=self.batch_size, n_process=n_process):
            ners = [ent.label_ for ent in doc.ents]
            count_ner.append(len(ners))

    # Convert the list of NER counts to a 2D numpy array
    return np.array(count_ner).reshape(-1, 1)

def get_spelling_error_features(self, cleaned_text):
    if self.spell_check:
        error_counts = []
        for text in cleaned_text:
            # Spell check the text and count the number of misspelled words
            corrected_text = self.spell_check_text(text)
            misspelled = self.spell_checker.unknown(corrected_text)
            error_counts.append(len(misspelled))
        return np.array(error_counts).reshape(-1, 1)
    else:
        return np.zeros((len(cleaned_text), 1)) # Return zeros if spell check is disabled

def spell_check_text(self, text):
    if self.spell_check:
        return [self.spell_checker.correction(word) for word in text]
    else:
        return text

def get_text_descriptive_features(self, cleaned_text):
    list_count_words = []
    list_count_characters = []
    list_count_characters_no_space = []
    list_avg_word_length = []
    list_count_digits = []

```

```

list_count_numbers = []
list_count_sentences = []

nlp = spacy.load(self.spacy_model)
disabled_pipes = ['tok2vec', 'tagger', 'parser', 'attribute_ruler',
'lemmatizer', 'ner']
with nlp.select_pipes(disable=disabled_pipes):
    if not nlp.has_pipe('sentencizer'):
        nlp.add_pipe('sentencizer')
    n_process = self.get_cores()
    for doc in nlp.pipe(cleaned_text, batch_size=self.batch_size, n_
process=n_process):
        count_word = len([token for token in doc if not token.is_pun
ct])

        count_char = len(doc.text)
        count_char_no_space = len(doc.text_with_ws.replace(' ', ''))
        avg_word_length = count_char_no_space / (count_word + 1)
        count_numbers = len([token for token in doc if token.is_digi
t])

        count_sentences = len(list(doc.sents))

        list_count_words.append(count_word)
        list_count_characters.append(count_char)
        list_count_characters_no_space.append(count_char_no_space)
        list_avg_word_length.append(avg_word_length)
        list_count_numbers.append(count_numbers)
        list_count_sentences.append(count_sentences)

    text_descriptive_features = np.vstack((list_count_words, list_count_
characters, list_count_characters_no_space, list_avg_word_length,
list_count_numbers, list_count_sentence
s))

    return np.transpose(text_descriptive_features)

def fit(self, X, y=None):

    return self

def transform(self, X, y=None):

    try:
        # Check if the input data is a list or numpy array
        if not isinstance(X, (list, np.ndarray)):
            raise TypeError(f"Expected list or numpy array, got {type
(X)}")

        feature_names = []

        if self.text_descriptive_features:
            text_descriptive_features = self.get_text_descriptive_featur
es(X)

            feature_names.extend(['count_words', 'count_characters',
'count_characters_no_space', 'avg_word

```

```

_length',
                                'count_numbers', 'count_sentences'])
    else:
        text_descriptive_features = np.empty(shape=(0, 0))

    # Add spelling error features
    if self.spell_check:
        spelling_error_features = self.get_spelling_error_features
(X)
        feature_names.append('spelling_errors')

    if self.pos_features:
        pos_features = self.get_pos_features(X)
        feature_names.extend(['noun_count', 'aux_count', 'verb_coun
t', 'adj_count'])
    else:
        pos_features = np.empty(shape=(0, 0))

    if self.ner_features:
        ner_features = self.get_ner_features(X)
        feature_names.extend(['ner'])
    else:
        ner_features = np.empty(shape=(0, 0))

    # Stack the feature arrays horizontally to form a single 2D nump
y array
    return np.hstack((text_descriptive_features, pos_features, ner_
features, spelling_error_features)), feature_names

except Exception as error:
    print(f'An exception occured: {repr(error)}')
File:      ~/Library/CloudStorage/GoogleDrive-harikrish0607@gmail.com/M
y Drive/Colab_Notebooks/BUAN_6342_Applied_Natural_Language_Processing/0_Cust
om_files/FeaturizerSpacy_w_SpellChecker.py
Type:      type
Subclasses:

```

```
In [ ]: X_train_features, feature_names = featurizer.fit_transform(X_train_cleaned_b
```

```
In [ ]: X_train_features[0:3]
```

```
Out[ ]: array([[ 28.          , 136.          , 109.          ,  3.75862069,
   1.          ,  2.          , 12.          ,  0.          ,
   3.          ,  2.          ,  1.          ,  0.          ],
 [ 18.          ,  88.          ,  71.          ,  3.73684211,
   0.          ,  3.          ,  4.          ,  1.          ,
   3.          ,  1.          ,  0.          ,  0.          ],
 [  6.          ,  25.          ,  20.          ,  2.85714286,
   0.          ,  2.          ,  0.          ,  1.          ,
   2.          ,  0.          ,  0.          ,  0.          ]])
```

```
In [ ]: feature_names
```

```
Out[ ]: ['count_words',
        'count_characters',
        'count_characters_no_space',
        'avg_word_length',
        'count_numbers',
        'count_sentences',
        'spelling_errors',
        'noun_count',
        'aux_count',
        'verb_count',
        'adj_count',
        'ner']
```

```
In [ ]: classifier_2 = Pipeline([
        ('classifier', LogisticRegression(max_iter=10000)),
    ])
```

```
In [ ]: import optuna
        from sklearn.model_selection import cross_val_score
        from sklearn.feature_extraction.text import TfidfVectorizer
        from sklearn.linear_model import LogisticRegression
        from sklearn.pipeline import Pipeline
        from sklearn.metrics import make_scorer, f1_score, recall_score, precision_s

        def objective(trial):
            # Define the hyperparameters to search over
            C = trial.suggest_loguniform('C', 1e-5, 100)
            weight = trial.suggest_float('weight', 0.1, 0.9)

            class_weight = {0: 1 - weight, 1: weight}

            # Create a pipeline with the current set of hyperparameters
            classifier_1 = Pipeline([
                ('classifier', LogisticRegression(max_iter=10000, C=C, class_weight=
            ])

            # Use cross-validation to evaluate the classifier with the current hyper
            # Use f1_score as the scoring metric
            scores = cross_val_score(classifier_1, X_train_features, y_train, cv=5,
            return scores.mean()
```

```
In [ ]: study = optuna.create_study(direction='maximize')
        study.optimize(objective, n_trials=100)
```

```

[I 2024-02-10 23:09:35,532] A new study created in memory with name: no-name
-d216896f-2a81-42d2-9fc9-e71672905b6a
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:35,643] Trial 0 finished with value: 0.7250793650793652
and parameters: {'C': 1.2698895339538292, 'weight': 0.7004355848270041}. Bes
t is trial 0 with value: 0.7250793650793652.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:35,945] Trial 1 finished with value: 0.707170868347339 a
nd parameters: {'C': 73.54192658056628, 'weight': 0.8097168708511949}. Best
is trial 0 with value: 0.7250793650793652.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,163] Trial 2 finished with value: 0.7432323232323232
and parameters: {'C': 32.47169983770629, 'weight': 0.5388257838837822}. Best
is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,204] Trial 3 finished with value: 0.0 and parameters:
{'C': 0.017681950834996442, 'weight': 0.26967468331629496}. Best is trial 2
with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,387] Trial 4 finished with value: 0.707170868347339 a
nd parameters: {'C': 79.57730772320078, 'weight': 0.7915662540022963}. Best
is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,412] Trial 5 finished with value: 0.5676750700280112
and parameters: {'C': 0.0001073115555023658, 'weight': 0.8316106486353115}.
Best is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,432] Trial 6 finished with value: 0.0 and parameters:

```



```
{'C': 1.2189901116154918e-05, 'weight': 0.7701027423608839}. Best is trial 2
with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,497] Trial 7 finished with value: 0.44825396825396824
and parameters: {'C': 0.08377112654314088, 'weight': 0.3823796696875892}. Be
st is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,520] Trial 8 finished with value: 0.5125965537730244
and parameters: {'C': 0.0001322290108813281, 'weight': 0.8820255401501986}.
Best is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,539] Trial 9 finished with value: 0.0 and parameters:
{'C': 0.0001353759198802439, 'weight': 0.12782048504316937}. Best is trial 2
with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,663] Trial 10 finished with value: 0.7038672438672439
and parameters: {'C': 2.1365784791532576, 'weight': 0.577260858670628}. Best
is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,774] Trial 11 finished with value: 0.7038672438672439
and parameters: {'C': 1.7640438031619032, 'weight': 0.6090288365641059}. Bes
t is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,906] Trial 12 finished with value: 0.7155555555555556
and parameters: {'C': 3.312551586470135, 'weight': 0.6395638191235605}. Best
is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:36,966] Trial 13 finished with value: 0.3911111111111111
```

```
and parameters: {'C': 0.06590908041875267, 'weight': 0.438196137329576}. Best
is trial 2 with value: 0.7432323232323232.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,106] Trial 14 finished with value: 0.7466666666666666
and parameters: {'C': 8.807861832157677, 'weight': 0.6941143684200776}. Best
is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,263] Trial 15 finished with value: 0.7232323232323232
and parameters: {'C': 17.205549392388992, 'weight': 0.5086411096130716}. Best
is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,298] Trial 16 finished with value: 0.0 and parameter
s: {'C': 0.004988549849587719, 'weight': 0.3547812140538492}. Best is trial
14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,373] Trial 17 finished with value: 0.6087878787878788
and parameters: {'C': 0.24592139730373908, 'weight': 0.5204934470079102}. Be
st is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,519] Trial 18 finished with value: 0.7466666666666666
and parameters: {'C': 18.80387053838522, 'weight': 0.6952234723972714}. Best
is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,670] Trial 19 finished with value: 0.7466666666666666
and parameters: {'C': 10.650471637671888, 'weight': 0.6866520152799251}. Bes
t is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,702] Trial 20 finished with value: 0.3864102564102564
```

and parameters: {'C': 0.00353914846256371, 'weight': 0.7341108414732657}. Best is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,862] Trial 21 finished with value: 0.7466666666666666 and parameters: {'C': 9.840786544572053, 'weight': 0.682806428549798}. Best is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:37,952] Trial 22 finished with value: 0.7184126984126984 and parameters: {'C': 0.3865791024359061, 'weight': 0.6588000707086615}. Best is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,098] Trial 23 finished with value: 0.7466666666666666 and parameters: {'C': 7.819363663638683, 'weight': 0.7254417907824084}. Best is trial 14 with value: 0.7466666666666666.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,170] Trial 24 finished with value: 0.7678635090399797 and parameters: {'C': 0.44186907958314264, 'weight': 0.8998435369174903}. Best is trial 24 with value: 0.7678635090399797.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,257] Trial 25 finished with value: 0.6233333333333333 and parameters: {'C': 0.42211338450419544, 'weight': 0.6053896842372846}. Best is trial 24 with value: 0.7678635090399797.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,348] Trial 26 finished with value: 0.7497619047619047 and parameters: {'C': 0.811115196055809, 'weight': 0.8954595661519325}. Best is trial 24 with value: 0.7678635090399797.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,434] Trial 27 finished with value: 0.7752164502164502

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and parameters: {'C': 0.6556305552340775, 'weight': 0.894567967232033}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,476] Trial 28 finished with value: 0.6841269841269841
and parameters: {'C': 0.02315621838139302, 'weight': 0.8865516960855486}. Be
st is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,568] Trial 29 finished with value: 0.7497619047619047
and parameters: {'C': 0.7973423812276681, 'weight': 0.8930518529828725}. Bes
t is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,627] Trial 30 finished with value: 0.6677350427350428
and parameters: {'C': 0.11116388411357332, 'weight': 0.8285072225225196}. Be
st is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,716] Trial 31 finished with value: 0.7497619047619047
and parameters: {'C': 0.8439835633145456, 'weight': 0.8991651655305116}. Bes
t is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,798] Trial 32 finished with value: 0.7497619047619047
and parameters: {'C': 0.5615566034792074, 'weight': 0.8508789850132672}. Bes
t is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,869] Trial 33 finished with value: 0.6694017094017094
and parameters: {'C': 0.16363932765509814, 'weight': 0.7895073095174098}. Be
st is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:38,978] Trial 34 finished with value: 0.7376470588235294
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and parameters: {'C': 3.7231016623728417, 'weight': 0.8514264633403558}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,077] Trial 35 finished with value: 0.7466666666666666
and parameters: {'C': 1.105695048019481, 'weight': 0.7508016310532286}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,124] Trial 36 finished with value: 0.6658119658119659
and parameters: {'C': 0.0517424481293205, 'weight': 0.8076877014125564}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,156] Trial 37 finished with value: 0.5994079449961803
and parameters: {'C': 0.006077232714660474, 'weight': 0.8977087581040245}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,227] Trial 38 finished with value: 0.7193589743589743
and parameters: {'C': 0.24046588597354523, 'weight': 0.8347324341008856}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,264] Trial 39 finished with value: 0.679040959040959
and parameters: {'C': 0.01186716578072559, 'weight': 0.7905817656239493}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,432] Trial 40 finished with value: 0.7289890501655207
and parameters: {'C': 42.07638063820315, 'weight': 0.8604511515950879}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,522] Trial 41 finished with value: 0.7497619047619047
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and parameters: {'C': 0.8924863981588053, 'weight': 0.8827777769761018}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,613] Trial 42 finished with value: 0.7497619047619047
and parameters: {'C': 0.813748360337159, 'weight': 0.898258828774492}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,738] Trial 43 finished with value: 0.7466666666666666
and parameters: {'C': 3.6477795067468506, 'weight': 0.7637413187892976}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,843] Trial 44 finished with value: 0.7309803921568627
and parameters: {'C': 1.6757664994041281, 'weight': 0.8098316265031011}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,871] Trial 45 finished with value: 0.5719974143503556
and parameters: {'C': 0.0014583698236369058, 'weight': 0.8548696786562457}.
Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,931] Trial 46 finished with value: 0.2071428571428571
3 and parameters: {'C': 0.1358310580098597, 'weight': 0.16653444855564903}.
Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:39,978] Trial 47 finished with value: 0.696923076923077
and parameters: {'C': 0.036169973181305985, 'weight': 0.8178138035180578}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,119] Trial 48 finished with value: 0.7383333333333333
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and parameters: {'C': 4.441120703282361, 'weight': 0.7767465613006116}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,206] Trial 49 finished with value: 0.6087878787878788 and parameters: {'C': 0.4070227607228069, 'weight': 0.46314224273313515}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,315] Trial 50 finished with value: 0.7555957767722474 and parameters: {'C': 2.1083073918665267, 'weight': 0.8671216852248422}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,422] Trial 51 finished with value: 0.7424089635854342 and parameters: {'C': 1.8258122193059794, 'weight': 0.8745005147752163}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,502] Trial 52 finished with value: 0.7368831168831169 and parameters: {'C': 0.6826961774796504, 'weight': 0.8379995739414537}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,576] Trial 53 finished with value: 0.7623959373959375 and parameters: {'C': 0.2567209546295611, 'weight': 0.8667535847955972}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,644] Trial 54 finished with value: 0.7448135198135198 and parameters: {'C': 0.18153272099838458, 'weight': 0.8660126580495088}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,701] Trial 55 finished with value: 0.3222222222222222

4 and parameters: {'C': 0.0757904759540108, 'weight': 0.3112252928267345}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,826] Trial 56 finished with value: 0.7466666666666666 and parameters: {'C': 2.0360778899455476, 'weight': 0.72876971792393}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,849] Trial 57 finished with value: 0.0 and parameters: {'C': 1.0562322073828433e-05, 'weight': 0.8117506476266939}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:40,930] Trial 58 finished with value: 0.7122588522588522 and parameters: {'C': 0.28532720558084185, 'weight': 0.7661755395628524}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:41,074] Trial 59 finished with value: 0.7248265460030167 and parameters: {'C': 6.5143546664668355, 'weight': 0.860317809979239}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:41,221] Trial 60 finished with value: 0.6808547008547008 and parameters: {'C': 30.480318635472347, 'weight': 0.18953326280346106}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:41,313] Trial 61 finished with value: 0.7424089635854342 and parameters: {'C': 1.1046805367021209, 'weight': 0.8944589460571032}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:41,403] Trial 62 finished with value: 0.7368831168831169


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and parameters: {'C': 0.5731493510798207, 'weight': 0.8359395134231947}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:41,512] Trial 63 finished with value: 0.7555957767722474
and parameters: {'C': 2.507218613899659, 'weight': 0.8781274785368222}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:41,641] Trial 64 finished with value: 0.7376470588235294
and parameters: {'C': 3.1932932586905123, 'weight': 0.8632340638103801}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:41,798] Trial 65 finished with value: 0.71815987933635 a
nd parameters: {'C': 13.529565192257236, 'weight': 0.8005768443004464}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:41,931] Trial 66 finished with value: 0.7155555555555556
and parameters: {'C': 5.811400202390375, 'weight': 0.5680180020633667}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,049] Trial 67 finished with value: 0.7237878787878789
and parameters: {'C': 2.7706849991591733, 'weight': 0.8347266651616855}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,148] Trial 68 finished with value: 0.7424089635854342
and parameters: {'C': 1.3910385438201567, 'weight': 0.8752539835964362}. Best
is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,226] Trial 69 finished with value: 0.7038672438672439

```

and parameters: {'C': 0.31958327616163273, 'weight': 0.7417425804198008}. Best is trial 27 with value: 0.7752164502164502.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,283] Trial 70 finished with value: 0.7766788766788768 and parameters: {'C': 0.11789088736088514, 'weight': 0.8994338399383455}. Best is trial 70 with value: 0.7766788766788768.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,342] Trial 71 finished with value: 0.7590964590964591 and parameters: {'C': 0.10194573008985293, 'weight': 0.8989415249090094}. Best is trial 70 with value: 0.7766788766788768.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,390] Trial 72 finished with value: 0.721590174531351 and parameters: {'C': 0.04692897068953697, 'weight': 0.8769825707114746}. Best is trial 70 with value: 0.7766788766788768.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,453] Trial 73 finished with value: 0.7071794871794872 and parameters: {'C': 0.09638490621191978, 'weight': 0.8373442841557875}. Best is trial 70 with value: 0.7766788766788768.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,515] Trial 74 finished with value: 0.8015567765567766 and parameters: {'C': 0.22823093369924694, 'weight': 0.898850258395965}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,554] Trial 75 finished with value: 0.721590174531351 and parameters: {'C': 0.015437659241664677, 'weight': 0.8546245163248756}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,629] Trial 76 finished with value: 0.6822222222222222

```
and parameters: {'C': 0.20206049446973667, 'weight': 0.782852630526598}. Best
is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,674] Trial 77 finished with value: 0.6881318681318682
and parameters: {'C': 0.024543176872862636, 'weight': 0.818745784861242}. Best
is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,731] Trial 78 finished with value: 0.7634615384615385
and parameters: {'C': 0.11456943155048234, 'weight': 0.8768840817654752}. Best
is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,791] Trial 79 finished with value: 0.7590964590964591
and parameters: {'C': 0.10881838330669075, 'weight': 0.8980868112055268}. Best
is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,835] Trial 80 finished with value: 0.7421029950441715
and parameters: {'C': 0.06018558874723756, 'weight': 0.8991804913776913}. Best
is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,894] Trial 81 finished with value: 0.7243006993006993
and parameters: {'C': 0.10969735587672809, 'weight': 0.8496694824302798}. Best
is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:42,954] Trial 82 finished with value: 0.7448135198135198
and parameters: {'C': 0.15003616902220673, 'weight': 0.8727846157137441}. Best
is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,040] Trial 83 finished with value: 0.7368831168831169
```

and parameters: {'C': 0.5191256042759169, 'weight': 0.815128977221544}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,081] Trial 84 finished with value: 0.7163614163614163 and parameters: {'C': 0.03759749153278692, 'weight': 0.899177871497993}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,157] Trial 85 finished with value: 0.7405128205128205 and parameters: {'C': 0.3224336321395782, 'weight': 0.8452158622423492}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,210] Trial 86 finished with value: 0.7495726495726496 and parameters: {'C': 0.08085438064943651, 'weight': 0.87498850095674}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,289] Trial 87 finished with value: 0.5771428571428572 and parameters: {'C': 0.19547875139518314, 'weight': 0.3865342021777778}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,326] Trial 88 finished with value: 0.6647552447552447 and parameters: {'C': 0.0098047424755794, 'weight': 0.8238951941463704}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,398] Trial 89 finished with value: 0.6828865578865579 and parameters: {'C': 0.13196720977405768, 'weight': 0.795718902929735}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,434] Trial 90 finished with value: 0.5581512605042017


```
and parameters: {'C': 1.914059530847369e-05, 'weight': 0.8604706869678698}.
Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,605] Trial 91 finished with value: 0.7752164502164502
and parameters: {'C': 0.40245067098923704, 'weight': 0.8861013858642302}. Be
st is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,743] Trial 92 finished with value: 0.7678635090399797
and parameters: {'C': 0.44457080129413357, 'weight': 0.8823576855222646}. Be
st is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,871] Trial 93 finished with value: 0.7424089635854342
and parameters: {'C': 0.4706089677085482, 'weight': 0.8809060265224272}. Bes
t is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:43,971] Trial 94 finished with value: 0.7405128205128205
and parameters: {'C': 0.2880586237472912, 'weight': 0.845525516759483}. Best
is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:44,076] Trial 95 finished with value: 0.7623959373959375
and parameters: {'C': 0.2096734282422439, 'weight': 0.8846768946642827}. Bes
t is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:44,249] Trial 96 finished with value: 0.7623959373959375
and parameters: {'C': 0.23971615046110692, 'weight': 0.8811925614554333}. Be
st is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.
py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:44,459] Trial 97 finished with value: 0.7623959373959375
```

```

and parameters: {'C': 0.23206692082672656, 'weight': 0.8826797793909361}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:44,637] Trial 98 finished with value: 0.7368831168831169 and parameters: {'C': 0.4599770195462979, 'weight': 0.8280550761766343}. Best is trial 74 with value: 0.8015567765567766.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2325454625.py:10: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:09:44,822] Trial 99 finished with value: 0.758095238095238 and parameters: {'C': 0.9438971888178072, 'weight': 0.8538186545544422}. Best is trial 74 with value: 0.8015567765567766.

```

```

In [ ]: # Get the best hyperparameters found by Optuna
best_C = study.best_params['C']
best_weight = study.best_params['weight']

```

```

In [ ]: study.best_params

```

```

Out[ ]: {'C': 0.22823093369924694, 'weight': 0.898850258395965}

```

```

In [ ]: study.best_value

```

```

Out[ ]: 0.8015567765567766

```

```

In [ ]: best_classifier_2 = Pipeline([
    ('classifier', LogisticRegression(max_iter=10000, C=best_C, class_weight=
)])

```

```

In [ ]: best_classifier_2.fit(X_train_features, y_train)

```

```

Out[ ]:
└─ Pipeline ⓘ ⓘ
  └─ LogisticRegression ⓘ

```

```

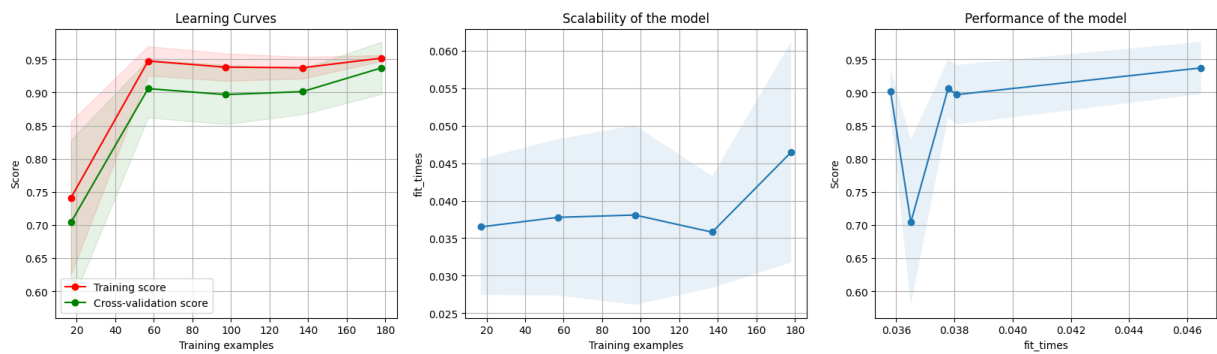
In [ ]: plot_learning_curve(best_classifier_2, 'Learning Curves',
    X_train_features, y_train, n_jobs=-1)

```

```

Out[ ]: <module 'matplotlib.pyplot' from '/opt/homebrew/anaconda3/envs/nlp/lib/python3.11/site-packages/matplotlib/pyplot.py'>

```

```
In [ ]: def final_pipeline(pipeline,text):
         features, feature_names = featurizer.fit_transform(text)
         predictions = pipeline.predict(features)
         return predictions
         y_test_pred = final_pipeline(best_classifier_2,X_test)
```

```
In [ ]: import sklearn.metrics as metrics
         print('\nTest set classification report:\n\n',
               metrics.classification_report(y_test, y_test_pred))
```

Test set classification report:

	precision	recall	f1-score	support
0	1.00	0.96	0.98	49
1	0.78	1.00	0.88	7
accuracy			0.96	56
macro avg	0.89	0.98	0.93	56
weighted avg	0.97	0.96	0.97	56

```
In [ ]: X_train_features
```

```
Out[ ]: array([[ 28., 136., 109., ...,  2.,  1.,  0.],
               [ 18.,  88.,  71., ...,  1.,  0.,  0.],
               [  6.,  25.,  20., ...,  0.,  0.,  0.],
               ...,
               [  6.,  28.,  23., ...,  0.,  0.,  0.],
               [ 29., 135., 110., ...,  1.,  1.,  0.],
               [  6.,  40.,  35., ...,  1.,  0.,  0.]])
```

```
In [ ]: X_train_cleaned_bow[:3]
```

```
Out[ ]: ['\\hello u.call wen u finish wrk.i fancy meetin wiv u tonite need break da
         books 4 hrs nite+2 today wrk!\\',
         'abeg profit start sponsor event',
         'send like']
```

```
In [ ]: feature_names
```

```
Out[ ]: ['count_words',
        'count_characters',
        'count_characters_no_space',
        'avg_word_length',
        'count_numbers',
        'count_sentences',
        'spelling_errors',
        'noun_count',
        'aux_count',
        'verb_count',
        'adj_count',
        'ner']
```

```
In [ ]: X_train_features.shape
```

```
Out[ ]: (223, 12)
```

```
In [ ]: X_train_final = pd.concat((pd.DataFrame(X_train_cleaned_bow, columns=['cleaned_text',
                                         'count_words', 'count_characters', 'count_characters_no_space', 'avg_word_length',
                                         'count_numbers', 'count_sentences', 'spelling_errors', 'noun_count', 'aux_count', 'verb_count', 'adj_count', 'ner']),
                                   pd.DataFrame(X_train_features, columns=feature_names)))
```

```
In [ ]: X_train_final.head()
```

```
Out[ ]:
```

	cleaned_text	count_words	count_characters	count_characters_no_space	avg_word_length
0	\hello u.call wen u finish wrk.i fancy meetin ...	28.0	136.0	109.0	2.86
1	abeg profit start sponsor event	18.0	88.0	71.0	2.67
2	send like	6.0	25.0	20.0	2.50
3	free ringtone wait collect simply text passwor...	22.0	125.0	104.0	2.73
4	play w computer aiyah tok 2 u lor	9.0	37.0	29.0	2.78

Sparse Embeddings (TF-IDF) + Feature Engineering

```
In [ ]: from sklearn.base import TransformerMixin, BaseEstimator
        from scipy.sparse import csr_matrix
        class SparseTransformer(TransformerMixin, BaseEstimator):
            def __init__(self):
                pass
```



```
Out[ ]: dict_keys(['memory', 'steps', 'verbose', 'combined_features', 'classifier',
'combined_features__n_jobs', 'combined_features__remainder__memory', 'combined_features__remainder__steps', 'combined_features__remainder__verbose', 'combined_features__remainder__sparse', 'combined_features__remainder', 'combined_features__sparse_threshold', 'combined_features__transformer_weights', 'combined_features__transformers', 'combined_features__verbose', 'combined_features__verbose_feature_names_out', 'combined_features__tfidf', 'combined_features__tfidf__memory', 'combined_features__tfidf__steps', 'combined_features__tfidf__verbose', 'combined_features__tfidf__tfidf', 'combined_features__tfidf__tfidf__analyzer', 'combined_features__tfidf__tfidf__binary', 'combined_features__tfidf__tfidf__decode_error', 'combined_features__tfidf__tfidf__dtype', 'combined_features__tfidf__tfidf__encoding', 'combined_features__tfidf__tfidf__input', 'combined_features__tfidf__tfidf__lowercase', 'combined_features__tfidf__tfidf__max_df', 'combined_features__tfidf__tfidf__max_features', 'combined_features__tfidf__tfidf__min_df', 'combined_features__tfidf__tfidf__ngram_range', 'combined_features__tfidf__tfidf__norm', 'combined_features__tfidf__tfidf__preprocessor', 'combined_features__tfidf__tfidf__smooth_idf', 'combined_features__tfidf__tfidf__stop_words', 'combined_features__tfidf__tfidf__strip_accents', 'combined_features__tfidf__tfidf__sublinear_tf', 'combined_features__tfidf__tfidf__token_pattern', 'combined_features__tfidf__tfidf__tokenizer', 'combined_features__tfidf__tfidf__use_idf', 'combined_features__tfidf__tfidf__vocabulary', 'classifier__C', 'classifier__class_weight', 'classifier__dual', 'classifier__fit_intercept', 'classifier__intercept_scaling', 'classifier__l1_ratio', 'classifier__max_iter', 'classifier__multi_class', 'classifier__n_jobs', 'classifier__penalty', 'classifier__random_state', 'classifier__solver', 'classifier__tol', 'classifier__verbose', 'classifier__warm_start'])
```

```
In [ ]: import optuna
from sklearn.compose import ColumnTransformer
from sklearn.pipeline import Pipeline
from sklearn.model_selection import cross_val_score
from sklearn.metrics import make_scorer, f1_score
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.linear_model import LogisticRegression

def objective(trial):
    # Define the hyperparameters to search over
    C = trial.suggest_loguniform('C', 1e-5, 100)
    combined_features__tfidf__tfidf__max_features = trial.suggest_int('combined_features__tfidf__tfidf__max_features', 1, 1000)
    weight = trial.suggest_float('weight', 0.1, 0.9)

    class_weight = {0: 1 - weight, 1: weight}

    # Use cross-validation to evaluate the classifier with the current hyperparameters
    # Use f1_score as the scoring metric
    scores = cross_val_score(classifier_3, X_train_final, y_train, cv=5, scoring='f1')
    return scores.mean()
```

```
In [ ]: study = optuna.create_study(direction='maximize')
study.optimize(objective, n_trials=100)
```

```
[I 2024-02-10 23:10:40,644] A new study created in memory with name: no-name-3cba03ab-4ef1-4dd0-86ea-0ae4395eb55e
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:40,982] Trial 0 finished with value: 0.6572005772005772 and parameters: {'C': 76.47970923231102, 'combined_features__tfidf__tfidf__max_features': 9871, 'weight': 0.4134389756478075}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:41,212] Trial 1 finished with value: 0.6572005772005772 and parameters: {'C': 0.3094480648021479, 'combined_features__tfidf__tfidf__max_features': 5648, 'weight': 0.48243079892808416}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:41,549] Trial 2 finished with value: 0.6572005772005772 and parameters: {'C': 42.5640967487999, 'combined_features__tfidf__tfidf__max_features': 912, 'weight': 0.47064828312705254}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:41,767] Trial 3 finished with value: 0.6572005772005772 and parameters: {'C': 0.0009101691317151461, 'combined_features__tfidf__tfidf__max_features': 8735, 'weight': 0.7289717795734393}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:41,942] Trial 4 finished with value: 0.6572005772005772 and parameters: {'C': 0.5048311665943958, 'combined_features__tfidf__tfidf__max_features': 3453, 'weight': 0.7375870456042034}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:42,116] Trial 5 finished with value: 0.6572005772005772 and parameters: {'C': 0.0013405411143846998, 'combined_features__tfidf__tfidf__max_features': 319, 'weight': 0.6341542496083217}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:42,290] Trial 6 finished with value: 0.6572005772005772
and parameters: {'C': 0.015129511824048132, 'combined_features__tfidf__tfidf__max_features': 1090, 'weight': 0.28361379231486505}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:42,464] Trial 7 finished with value: 0.6572005772005772
and parameters: {'C': 0.39401961754923437, 'combined_features__tfidf__tfidf__max_features': 8866, 'weight': 0.18591812429295365}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:42,641] Trial 8 finished with value: 0.6572005772005772
and parameters: {'C': 0.004256388602195834, 'combined_features__tfidf__tfidf__max_features': 5022, 'weight': 0.31085521910171987}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:42,816] Trial 9 finished with value: 0.6572005772005772
and parameters: {'C': 0.0003455043717988141, 'combined_features__tfidf__tfidf__max_features': 9201, 'weight': 0.7227508389965656}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:42,999] Trial 10 finished with value: 0.6572005772005772
and parameters: {'C': 1.4819378262719582e-05, 'combined_features__tfidf__tfidf__max_features': 6876, 'weight': 0.12310816488378862}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:43,197] Trial 11 finished with value: 0.6572005772005772
and parameters: {'C': 79.31445939470296, 'combined_features__tfidf__tfidf__max_features': 6848, 'weight': 0.4992979512357216}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
```


feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use `suggest_float(..., log=True)` instead.

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:43,435] Trial 12 finished with value: 0.6572005772005772
and parameters: {'C': 2.4274176829909937, 'combined_features__tfidf__tfidf__
max_features': 3406, 'weight': 0.39554057051436375}. Best is trial 0 with va
lue: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:43,636] Trial 13 finished with value: 0.6572005772005772
and parameters: {'C': 3.267679506919434, 'combined_features__tfidf__tfidf__m
ax_features': 7222, 'weight': 0.8759793536918492}. Best is trial 0 with valu
e: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:43,842] Trial 14 finished with value: 0.6572005772005772
and parameters: {'C': 0.08538528634961864, 'combined_features__tfidf__tfidf__
_max_features': 5039, 'weight': 0.5910445927647041}. Best is trial 0 with va
lue: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:44,039] Trial 15 finished with value: 0.6572005772005772
and parameters: {'C': 7.250880109866882, 'combined_features__tfidf__tfidf__m
ax_features': 9899, 'weight': 0.3041485587643137}. Best is trial 0 with valu
e: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:44,223] Trial 16 finished with value: 0.6572005772005772
and parameters: {'C': 0.08059348340835655, 'combined_features__tfidf__tfidf__
_max_features': 3012, 'weight': 0.4360017244484589}. Best is trial 0 with va
lue: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:44,428] Trial 17 finished with value: 0.6572005772005772
and parameters: {'C': 16.055457851871978, 'combined_features__tfidf__tfidf__
_max_features': 8088, 'weight': 0.5764773414229761}. Best is trial 0 with val
ue: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:44,755] Trial 18 finished with value: 0.6572005772005772
and parameters: {'C': 0.8890325859903189, 'combined_features__tfidf__tfidf__
max_features': 5948, 'weight': 0.4010725787078958}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:45,210] Trial 19 finished with value: 0.6572005772005772
and parameters: {'C': 6.81532998479793e-05, 'combined_features__tfidf__tfidf__
max_features': 2291, 'weight': 0.5342735643971656}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:45,486] Trial 20 finished with value: 0.6572005772005772
and parameters: {'C': 0.015601310489999833, 'combined_features__tfidf__tfidf__
max_features': 4144, 'weight': 0.36030028899064437}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:45,669] Trial 21 finished with value: 0.6572005772005772
and parameters: {'C': 49.45893988913405, 'combined_features__tfidf__tfidf__m
ax_features': 1891, 'weight': 0.44215457352210663}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:45,853] Trial 22 finished with value: 0.6572005772005772
and parameters: {'C': 12.044346400300931, 'combined_features__tfidf__tfidf__
max_features': 5623, 'weight': 0.4806408611391752}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:46,037] Trial 23 finished with value: 0.6572005772005772
and parameters: {'C': 93.1799835988889, 'combined_features__tfidf__tfidf__ma
x_features': 7624, 'weight': 0.21788322480869343}. Best is trial 0 with valu
e: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:46,222] Trial 24 finished with value: 0.6572005772005772
```

```
and parameters: {'C': 25.695679200866646, 'combined_features__tfidf__tfidf__
max_features': 399, 'weight': 0.6409471290252666}. Best is trial 0 with valu
e: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:46,416] Trial 25 finished with value: 0.6572005772005772
and parameters: {'C': 2.4305982138052196, 'combined_features__tfidf__tfidf__
max_features': 1588, 'weight': 0.5152762713503379}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:46,624] Trial 26 finished with value: 0.6572005772005772
and parameters: {'C': 0.09074607579983494, 'combined_features__tfidf__tfidf__
_max_features': 6336, 'weight': 0.37409422842397755}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:46,878] Trial 27 finished with value: 0.6572005772005772
and parameters: {'C': 6.842634787777967, 'combined_features__tfidf__tfidf__m
ax_features': 9957, 'weight': 0.44941810957744555}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:47,082] Trial 28 finished with value: 0.6572005772005772
and parameters: {'C': 1.1688983961270834, 'combined_features__tfidf__tfidf__
max_features': 4020, 'weight': 0.573482278479546}. Best is trial 0 with valu
e: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:47,283] Trial 29 finished with value: 0.6572005772005772
and parameters: {'C': 0.20034647476405365, 'combined_features__tfidf__tfidf__
_max_features': 8290, 'weight': 0.6985967381160909}. Best is trial 0 with va
lue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:47,472] Trial 30 finished with value: 0.6572005772005772
and parameters: {'C': 32.667194594746455, 'combined_features__tfidf__tfidf__
max_features': 4432, 'weight': 0.8648934596841376}. Best is trial 0 with val
```

```

ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:47,658] Trial 31 finished with value: 0.6572005772005772
and parameters: {'C': 0.001386189707523588, 'combined_features__tfidf__tfidf
__max_features': 9067, 'weight': 0.7958215955299448}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:47,845] Trial 32 finished with value: 0.6572005772005772
and parameters: {'C': 0.00024148389249978118, 'combined_features__tfidf__tfi
df__max_features': 8411, 'weight': 0.6537949190968537}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:48,034] Trial 33 finished with value: 0.6572005772005772
and parameters: {'C': 0.002188792328341339, 'combined_features__tfidf__tfidf
__max_features': 2636, 'weight': 0.33658128101774426}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:48,225] Trial 34 finished with value: 0.6572005772005772
and parameters: {'C': 0.014810343812142548, 'combined_features__tfidf__tfidf
__max_features': 9544, 'weight': 0.7859137312763795}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:48,413] Trial 35 finished with value: 0.6572005772005772
and parameters: {'C': 0.006908480025438169, 'combined_features__tfidf__tfidf
__max_features': 7527, 'weight': 0.24458414394258937}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:48,599] Trial 36 finished with value: 0.6572005772005772
and parameters: {'C': 0.00036913186703487703, 'combined_features__tfidf__tfi
df__max_features': 8696, 'weight': 0.5495220868378115}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.

```



```
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:48,786] Trial 37 finished with value: 0.6572005772005772
and parameters: {'C': 0.3500112352413946, 'combined_features__tfidf__tfidf__
max_features': 5569, 'weight': 0.4803034023347197}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:48,983] Trial 38 finished with value: 0.6572005772005772
and parameters: {'C': 4.33578759233745e-05, 'combined_features__tfidf__tfidf
__max_features': 1202, 'weight': 0.6144597519664805}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:49,187] Trial 39 finished with value: 0.6572005772005772
and parameters: {'C': 0.0007917406607789709, 'combined_features__tfidf__tfidf
f__max_features': 9387, 'weight': 0.4094162356724139}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:49,376] Trial 40 finished with value: 0.6572005772005772
and parameters: {'C': 3.9022845827059673, 'combined_features__tfidf__tfidf__
max_features': 6769, 'weight': 0.2659518201945127}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:49,562] Trial 41 finished with value: 0.6572005772005772
and parameters: {'C': 0.974453325984537, 'combined_features__tfidf__tfidf__m
ax_features': 3202, 'weight': 0.7504905761162045}. Best is trial 0 with valu
e: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:49,747] Trial 42 finished with value: 0.6572005772005772
and parameters: {'C': 0.033365930619195724, 'combined_features__tfidf__tfidf
__max_features': 492, 'weight': 0.6819139666233253}. Best is trial 0 with va
lue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
```

ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:49,933] Trial 43 finished with value: 0.6572005772005772
and parameters: {'C': 0.24188552462431331, 'combined_features__tfidf__tfidf__
_max_features': 3739, 'weight': 0.8135719997720285}. Best is trial 0 with va
lue: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:50,120] Trial 44 finished with value: 0.6572005772005772
and parameters: {'C': 0.7088633893641536, 'combined_features__tfidf__tfidf__
_max_features': 4413, 'weight': 0.1052186541606504}. Best is trial 0 with val
ue: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:50,306] Trial 45 finished with value: 0.6572005772005772
and parameters: {'C': 16.578394201891143, 'combined_features__tfidf__tfidf__
_max_features': 900, 'weight': 0.4732079791813707}. Best is trial 0 with valu
e: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:50,492] Trial 46 finished with value: 0.6572005772005772
and parameters: {'C': 1.020973241033354e-05, 'combined_features__tfidf__tfidf
_max_features': 4748, 'weight': 0.7403645655724543}. Best is trial 0 with
value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:50,678] Trial 47 finished with value: 0.6572005772005772
and parameters: {'C': 0.03556288716334406, 'combined_features__tfidf__tfidf__
_max_features': 2549, 'weight': 0.8468999888468334}. Best is trial 0 with va
lue: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:50,865] Trial 48 finished with value: 0.6572005772005772
and parameters: {'C': 43.68771603446479, 'combined_features__tfidf__tfidf__m
ax_features': 8875, 'weight': 0.8951669459132047}. Best is trial 0 with valu
e: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
```


[I 2024-02-10 23:10:51,053] Trial 49 finished with value: 0.6572005772005772 and parameters: {'C': 7.649438606835259, 'combined_features__tfidf__tfidf__max_features': 3535, 'weight': 0.3282365179445851}. Best is trial 0 with value: 0.6572005772005772.

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.

C = trial.suggest_loguniform('C', 1e-5, 100)

[I 2024-02-10 23:10:51,240] Trial 50 finished with value: 0.6572005772005772 and parameters: {'C': 0.08307129354541283, 'combined_features__tfidf__tfidf__max_features': 7872, 'weight': 0.5386293006315266}. Best is trial 0 with value: 0.6572005772005772.

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.

C = trial.suggest_loguniform('C', 1e-5, 100)

[I 2024-02-10 23:10:51,427] Trial 51 finished with value: 0.6572005772005772 and parameters: {'C': 0.006718238337593601, 'combined_features__tfidf__tfidf__max_features': 884, 'weight': 0.6200338070206304}. Best is trial 0 with value: 0.6572005772005772.

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.

C = trial.suggest_loguniform('C', 1e-5, 100)

[I 2024-02-10 23:10:51,614] Trial 52 finished with value: 0.6572005772005772 and parameters: {'C': 8.77495922315535e-05, 'combined_features__tfidf__tfidf__max_features': 1609, 'weight': 0.6922419465935041}. Best is trial 0 with value: 0.6572005772005772.

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.

C = trial.suggest_loguniform('C', 1e-5, 100)

[I 2024-02-10 23:10:51,803] Trial 53 finished with value: 0.6572005772005772 and parameters: {'C': 0.0026448403213161524, 'combined_features__tfidf__tfidf__max_features': 355, 'weight': 0.7564654876668299}. Best is trial 0 with value: 0.6572005772005772.

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.

C = trial.suggest_loguniform('C', 1e-5, 100)

[I 2024-02-10 23:10:51,991] Trial 54 finished with value: 0.6572005772005772 and parameters: {'C': 94.55459462234806, 'combined_features__tfidf__tfidf__max_features': 2025, 'weight': 0.4221893295882221}. Best is trial 0 with value: 0.6572005772005772.

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use suggest_float(..., log=True) instead.

C = trial.suggest_loguniform('C', 1e-5, 100)

[I 2024-02-10 23:10:52,178] Trial 55 finished with value: 0.6572005772005772 and parameters: {'C': 0.000809356222752913, 'combined_features__tfidf__tfidf

```
__max_features': 1442, 'weight': 0.5066727018601639}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:52,369] Trial 56 finished with value: 0.6572005772005772
and parameters: {'C': 0.015477536373345573, 'combined_features__tfidf__tfidf__
__max_features': 5551, 'weight': 0.7243885964818463}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:52,558] Trial 57 finished with value: 0.6572005772005772
and parameters: {'C': 1.8657526904548392, 'combined_features__tfidf__tfidf__
__max_features': 138, 'weight': 0.658903501092373}. Best is trial 0 with valu
e: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:52,745] Trial 58 finished with value: 0.6572005772005772
and parameters: {'C': 0.0002522329293516432, 'combined_features__tfidf__tfidf__
__max_features': 6568, 'weight': 0.3856973473496643}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:52,943] Trial 59 finished with value: 0.6572005772005772
and parameters: {'C': 0.4899896470847121, 'combined_features__tfidf__tfidf__
__max_features': 2914, 'weight': 0.5627479239064019}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:53,131] Trial 60 finished with value: 0.6572005772005772
and parameters: {'C': 59.86145721668611, 'combined_features__tfidf__tfidf__m
ax_features': 7185, 'weight': 0.5859829883471652}. Best is trial 0 with valu
e: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:53,319] Trial 61 finished with value: 0.6572005772005772
and parameters: {'C': 0.14617395413487086, 'combined_features__tfidf__tfidf__
__max_features': 849, 'weight': 0.3505492251881324}. Best is trial 0 with val
ue: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:53,506] Trial 62 finished with value: 0.6572005772005772 and parameters: {'C': 0.0044914231171358085, 'combined_features__tfidf__tfidf__max_features': 9616, 'weight': 0.18575518230934213}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:53,694] Trial 63 finished with value: 0.6572005772005772 and parameters: {'C': 0.046078231317813044, 'combined_features__tfidf__tfidf__max_features': 2108, 'weight': 0.29197330238703423}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:53,883] Trial 64 finished with value: 0.6572005772005772 and parameters: {'C': 20.238302299543857, 'combined_features__tfidf__tfidf__max_features': 1262, 'weight': 0.45660783888341816}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:54,072] Trial 65 finished with value: 0.6572005772005772 and parameters: {'C': 0.0005596226760116509, 'combined_features__tfidf__tfidf__max_features': 6053, 'weight': 0.1786959436226736}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:54,261] Trial 66 finished with value: 0.6572005772005772 and parameters: {'C': 4.285595042745302, 'combined_features__tfidf__tfidf__max_features': 636, 'weight': 0.7103247181855981}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:54,449] Trial 67 finished with value: 0.6572005772005772 and parameters: {'C': 0.001908028179743875, 'combined_features__tfidf__tfidf__max_features': 5227, 'weight': 0.7756358287389675}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
```

feature will be removed in v6.0.0. See <https://github.com/optuna/optuna/releases/tag/v3.0.0>. Use `suggest_float(..., log=True)` instead.

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:54,637] Trial 68 finished with value: 0.6572005772005772
and parameters: {'C': 0.00011725443828027734, 'combined_features__tfidf__tfidf__max_features': 1750, 'weight': 0.5134454388759381}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:54,832] Trial 69 finished with value: 0.6572005772005772
and parameters: {'C': 0.022286892465973065, 'combined_features__tfidf__tfidf__max_features': 172, 'weight': 0.6021506042398183}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:55,021] Trial 70 finished with value: 0.6572005772005772
and parameters: {'C': 0.007640073393689825, 'combined_features__tfidf__tfidf__max_features': 9729, 'weight': 0.4338470520900403}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:55,210] Trial 71 finished with value: 0.6572005772005772
and parameters: {'C': 0.16638511626853372, 'combined_features__tfidf__tfidf__max_features': 9144, 'weight': 0.13797407716698953}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:55,398] Trial 72 finished with value: 0.6572005772005772
and parameters: {'C': 9.80062569437644, 'combined_features__tfidf__tfidf__max_features': 8100, 'weight': 0.269518040750531}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```

```
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:55,591] Trial 73 finished with value: 0.6572005772005772
and parameters: {'C': 0.33368995275684965, 'combined_features__tfidf__tfidf__max_features': 8608, 'weight': 0.2176163132125391}. Best is trial 0 with value: 0.6572005772005772.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
```



```

C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:55,825] Trial 74 finished with value: 0.6572005772005772
and parameters: {'C': 1.5679109292191287, 'combined_features__tfidf__tfidf__
max_features': 9301, 'weight': 0.8287125594820199}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:56,044] Trial 75 finished with value: 0.6572005772005772
and parameters: {'C': 0.0547988457960963, 'combined_features__tfidf__tfidf__
max_features': 9899, 'weight': 0.15889539402801217}. Best is trial 0 with va
lue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:56,309] Trial 76 finished with value: 0.6572005772005772
and parameters: {'C': 0.00127180485873453, 'combined_features__tfidf__tfidf__
_max_features': 1169, 'weight': 0.49569178705846145}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:56,530] Trial 77 finished with value: 0.6572005772005772
and parameters: {'C': 0.7133829820993266, 'combined_features__tfidf__tfidf__
max_features': 8886, 'weight': 0.6725693368047536}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:56,744] Trial 78 finished with value: 0.6572005772005772
and parameters: {'C': 38.19296400244871, 'combined_features__tfidf__tfidf__m
ax_features': 7737, 'weight': 0.4575036225507767}. Best is trial 0 with valu
e: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:57,106] Trial 79 finished with value: 0.6572005772005772
and parameters: {'C': 0.0037467384465955334, 'combined_features__tfidf__tfidf
f__max_features': 2342, 'weight': 0.22757198966982928}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:57,450] Trial 80 finished with value: 0.6572005772005772

```

```
and parameters: {'C': 57.31749222650803, 'combined_features__tfidf__tfidf__max_features': 7223, 'weight': 0.3779693099728163}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:57,749] Trial 81 finished with value: 0.6572005772005772 and parameters: {'C': 0.01234565400888515, 'combined_features__tfidf__tfidf__max_features': 4714, 'weight': 0.3092219573542836}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:58,259] Trial 82 finished with value: 0.6572005772005772 and parameters: {'C': 0.00962707125031314, 'combined_features__tfidf__tfidf__max_features': 6207, 'weight': 0.3547497409221916}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:58,506] Trial 83 finished with value: 0.6572005772005772 and parameters: {'C': 0.023332896478947075, 'combined_features__tfidf__tfidf__max_features': 3997, 'weight': 0.4007162133988631}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:58,744] Trial 84 finished with value: 0.6572005772005772 and parameters: {'C': 0.004828728695549009, 'combined_features__tfidf__tfidf__max_features': 3750, 'weight': 0.2782535884902792}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:59,044] Trial 85 finished with value: 0.6572005772005772 and parameters: {'C': 0.0010569021827521127, 'combined_features__tfidf__tfidf__max_features': 726, 'weight': 0.6385267165265592}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This feature will be removed in v6.0.0. See https://github.com/optuna/optuna/releases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:59,291] Trial 86 finished with value: 0.6572005772005772 and parameters: {'C': 0.0028704722439946875, 'combined_features__tfidf__tfidf__max_features': 8265, 'weight': 0.24076523265131905}. Best is trial 0 with
```



```
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:59,491] Trial 87 finished with value: 0.6572005772005772
and parameters: {'C': 2.6374285623378606, 'combined_features__tfidf__tfidf__
_max_features': 3034, 'weight': 0.5353441169378801}. Best is trial 0 with val
ue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:10:59,687] Trial 88 finished with value: 0.6572005772005772
and parameters: {'C': 0.12432934581892463, 'combined_features__tfidf__tfidf__
_max_features': 5259, 'weight': 0.42782896590822883}. Best is trial 0 with v
alue: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:00,061] Trial 89 finished with value: 0.6572005772005772
and parameters: {'C': 0.00037952096606708597, 'combined_features__tfidf__tfi
df__max_features': 1144, 'weight': 0.333018580771118}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:00,338] Trial 90 finished with value: 0.6572005772005772
and parameters: {'C': 0.002008934607836569, 'combined_features__tfidf__tfidf
__max_features': 4285, 'weight': 0.20096836362513976}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:00,574] Trial 91 finished with value: 0.6572005772005772
and parameters: {'C': 0.00015743481911524576, 'combined_features__tfidf__tfi
df__max_features': 9993, 'weight': 0.7275800628491494}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
  C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:00,809] Trial 92 finished with value: 0.6572005772005772
and parameters: {'C': 4.275895724892047e-05, 'combined_features__tfidf__tfidf
__max_features': 9506, 'weight': 0.7537166550111732}. Best is trial 0 with
value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
```

```

py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:01,006] Trial 93 finished with value: 0.6572005772005772
and parameters: {'C': 0.0006955453786124017, 'combined_features__tfidf__tfidf__max_features': 8528, 'weight': 0.8002862160585938}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:01,196] Trial 94 finished with value: 0.6572005772005772
and parameters: {'C': 0.00044769912847917914, 'combined_features__tfidf__tfidf__max_features': 8942, 'weight': 0.775562006173428}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:01,388] Trial 95 finished with value: 0.6572005772005772
and parameters: {'C': 22.99125371481944, 'combined_features__tfidf__tfidf__max_features': 9301, 'weight': 0.48202561698268104}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:01,579] Trial 96 finished with value: 0.6572005772005772
and parameters: {'C': 0.00025022964590722986, 'combined_features__tfidf__tfidf__max_features': 5714, 'weight': 0.7132086911677757}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:01,771] Trial 97 finished with value: 0.6572005772005772
and parameters: {'C': 0.0011786497680906433, 'combined_features__tfidf__tfidf__max_features': 376, 'weight': 0.3089982412858477}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
    C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-10 23:11:01,963] Trial 98 finished with value: 0.6572005772005772
and parameters: {'C': 0.47490997204165686, 'combined_features__tfidf__tfidf__max_features': 4782, 'weight': 0.5246910910436595}. Best is trial 0 with value: 0.6572005772005772.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_77497/2587201369.
py:11: FutureWarning: suggest_loguniform has been deprecated in v3.0.0. This
feature will be removed in v6.0.0. See https://github.com/optuna/optuna/rele

```

```
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.  
C = trial.suggest_loguniform('C', 1e-5, 100)  
[I 2024-02-10 23:11:02,154] Trial 99 finished with value: 0.6572005772005772  
and parameters: {'C': 0.2312309022110591, 'combined_features__tfidf__tfidf__  
max_features': 9054, 'weight': 0.410879946250452}. Best is trial 0 with valu  
e: 0.6572005772005772.
```

```
In [ ]: study.best_params
```

```
Out[ ]: {'C': 76.47970923231102,  
        'combined_features__tfidf__tfidf__max_features': 9871,  
        'weight': 0.4134389756478075}
```

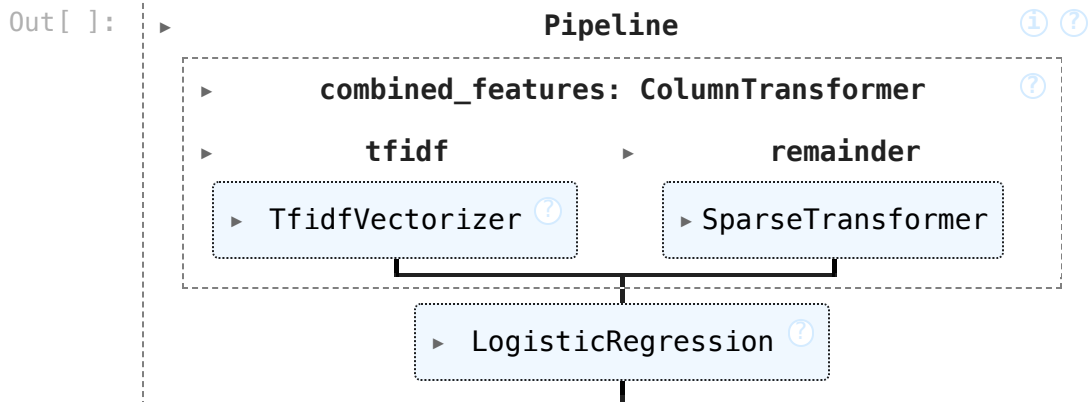
```
In [ ]: study.best_value
```

```
Out[ ]: 0.6572005772005772
```

```
In [ ]: # Get the best hyperparameters found by Optuna  
best_max_features = study.best_params['combined_features__tfidf__tfidf__max_  
best_C = study.best_params['C']  
best_weight = study.best_params['weight']
```

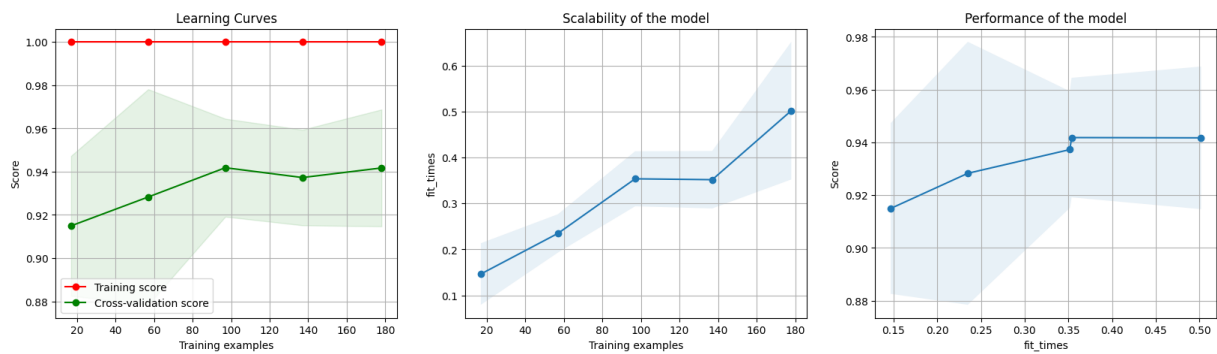
```
In [ ]: best_classifier_3 = Pipeline([('combined_features',  
                                     ColumnTransformer( transformers=[('tfidf',  
                                                                       TfidfVector  
                                                                       remainder=sparse_features))  
                                     ('classifier', LogisticRegression(max_iter=100  
                                                                       class_weight
```

```
In [ ]: best_classifier_3.fit(X_train_final, y_train)
```



```
In [ ]: # plot learning curves  
plot_learning_curve(best_classifier_3, 'Learning Curves',  
                    X_train_final, y_train, n_jobs=-1)
```

```
Out[ ]: <module 'matplotlib.pyplot' from '/opt/homebrew/anaconda3/envs/nlp/lib/pyth  
on3.11/site-packages/matplotlib/pyplot.py'>
```



```
In [ ]: # Final Pipeline
def final_pipeline(text):
    X_features, feature_names = featurizer.fit_transform(text)
    cleaned_text = X_test_cleaned_bow
    X_final = pd.concat((pd.DataFrame(cleaned_text, columns=['cleaned_text']),
                           pd.DataFrame(X_features, columns=feature_names)), axis=1)
    predictions = best_classifier_3.predict(X_final)
    return predictions
y_test_pred = final_pipeline(X_test)
```

```
In [ ]: print('\nTest set classification report:\n\n',
              metrics.classification_report(y_test, y_test_pred))
```

Test set classification report:

	precision	recall	f1-score	support
0	0.98	1.00	0.99	49
1	1.00	0.86	0.92	7
accuracy			0.98	56
macro avg	0.99	0.93	0.96	56
weighted avg	0.98	0.98	0.98	56