

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_43880/1337418617.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_43880/1359867004.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_43880/1359867004.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['label'].value_counts(normalize=True)*100
```

```
Out[ ]: label
0      86.593683
1      13.406317
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['message'].values
y = spam_df['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])
```

```
['Aight do you still want to get money'
'I'm home, my love ... If your still awake ... *loving kiss*'
'It so happens that there r 2waxsto do wat you want. She can come and ill g
et her medical insurance. And she'll be able to deliver and have basic care.
I'm currently shopping for the right medical insurance for her. So just give
me til friday morning. Thats when i.ll see the major person that can guide m
e to the right insurance.'
'Oh... I was thkin of goin yogasana at 10 den no nd to go at 3 den can rush
to parco 4 nb... Okie lor, u call me when ready...'
'Have you had a good day? Mine was really busy are you up to much tomorrow
night?']
[0 0 0 0 0]
['Aight, you close by or still down around alex's place?'
'Wife.how she knew the time of murder exactly'
'I will cme i want to go to hos 2morow. After that i wil cme. This what i g
ot from her dear what to do. She didnt say any time'
'Fuck babe ... I miss you already, you know ? Can't you let me send you som
e money towards your net ? I need you ... I want you ... I crave you ...'
'Yeah that's the impression I got"]
[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/'0_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.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 [ ]: # 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: 0.8658290329818263, 1: 0.13417096701817366}

```

```

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

```

```

Out[ ]: {1: 0.8658290329818263, 0: 0.13417096701817366}

```

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_score

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=class_weight))
    ])

    # Use cross-validation to evaluate the classifier with the current hyperparameters
    # 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 2024-02-11 11:30:29,654] A new study created in memory with name: no-name
-86fe8e90-2779-4ba2-9389-7b9367e4b642
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:30,304] Trial 0 finished with value: 0.0 and parameters:
{'max_features': 2272, 'C': 0.05792357795496763, 'weight': 0.478671646686593
34}. Best is trial 0 with value: 0.0.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:30,617] Trial 1 finished with value: 0.10723242477285988
and parameters: {'max_features': 503, 'C': 0.4075302880050901, 'weight': 0.2
9645040788273314}. Best is trial 1 with value: 0.10723242477285988.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:30,943] Trial 2 finished with value: 0.0 and parameters:
{'max_features': 3881, 'C': 0.001890947237828919, 'weight': 0.28969218477062
764}. Best is trial 1 with value: 0.10723242477285988.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:31,327] Trial 3 finished with value: 0.0 and parameters:
{'max_features': 8702, 'C': 0.01757285639517484, 'weight': 0.427071742990304
37}. Best is trial 1 with value: 0.10723242477285988.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:31,698] Trial 4 finished with value: 0.0 and parameters:
{'max_features': 804, 'C': 0.9570580281193246, 'weight': 0.1274210710844775
3}. Best is trial 1 with value: 0.10723242477285988.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:32,036] Trial 5 finished with value: 0.9292738521164117
and parameters: {'max_features': 1695, 'C': 6.870009456475512, 'weight': 0.6
870925062656813}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:32,374] Trial 6 finished with value: 0.0 and parameters:

```

```
{'max_features': 5275, 'C': 0.004162745919569406, 'weight': 0.36736572514107757}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:32,818] Trial 7 finished with value: 0.8687420778770056 and parameters: {'max_features': 5387, 'C': 4.265937265006734, 'weight': 0.3786317722972822}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:33,158] Trial 8 finished with value: 0.0 and parameters: {'max_features': 2220, 'C': 2.830927675646106e-05, 'weight': 0.5417843732584933}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:33,580] Trial 9 finished with value: 0.8858419311115375 and parameters: {'max_features': 7680, 'C': 36.188524503965475, 'weight': 0.15209132125687114}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:33,947] Trial 10 finished with value: 0.9265884002180906 and parameters: {'max_features': 3469, 'C': 98.59889495442908, 'weight': 0.8550903275955588}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:34,318] Trial 11 finished with value: 0.9288076108667214 and parameters: {'max_features': 3341, 'C': 65.8425650948198, 'weight': 0.8252430170522718}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:34,718] Trial 12 finished with value: 0.9277659974381869 and parameters: {'max_features': 2254, 'C': 9.463844781756965, 'weight': 0.7657933443953963}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:35,139] Trial 13 finished with value: 0.909900232107371
```

```
and parameters: {'max_features': 6658, 'C': 2.543119553892815, 'weight': 0.6
563777458446771}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:35,465] Trial 14 finished with value: 0.225014466942954
and parameters: {'max_features': 3612, 'C': 0.17393074377375572, 'weight':
0.6723201769760335}. Best is trial 5 with value: 0.9292738521164117.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:35,926] Trial 15 finished with value: 0.9326908498308093
and parameters: {'max_features': 9914, 'C': 25.399919424055525, 'weight': 0.
7793635009478231}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:36,422] Trial 16 finished with value: 0.9303602109305796
and parameters: {'max_features': 9618, 'C': 10.645112039268872, 'weight': 0.
6568607315249829}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:36,802] Trial 17 finished with value: 0.2365968306287472
8 and parameters: {'max_features': 9801, 'C': 0.00034665959429967276, 'weigh
t': 0.8980199306065393}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:37,338] Trial 18 finished with value: 0.9300976974639026
and parameters: {'max_features': 9783, 'C': 14.258331695991204, 'weight': 0.
5734086186538824}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:37,754] Trial 19 finished with value: 0.9043175490167459
and parameters: {'max_features': 8174, 'C': 1.0782002329379072, 'weight': 0.
7637075318814118}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:38,101] Trial 20 finished with value: 0.0 and parameter
```

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s: {'max_features': 6749, 'C': 0.08794761419437697, 'weight': 0.638804633714
6855}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:38,609] Trial 21 finished with value: 0.9302275849358846
and parameters: {'max_features': 9990, 'C': 18.952443181703913, 'weight': 0.
5640478631149637}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:39,044] Trial 22 finished with value: 0.9302232530039849
and parameters: {'max_features': 9117, 'C': 16.843560981261138, 'weight': 0.
5882828797165544}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:39,445] Trial 23 finished with value: 0.9162860561184395
and parameters: {'max_features': 7460, 'C': 2.1887922091166425, 'weight': 0.
7468524366432798}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:39,993] Trial 24 finished with value: 0.9318504350076967
and parameters: {'max_features': 9217, 'C': 32.17905124981719, 'weight': 0.5
072488855714626}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:40,450] Trial 25 finished with value: 0.9313944262606404
and parameters: {'max_features': 8837, 'C': 99.29592390936153, 'weight': 0.4
7838904647193464}. Best is trial 15 with value: 0.9326908498308093.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:40,915] Trial 26 finished with value: 0.9336914464359483
and parameters: {'max_features': 8635, 'C': 57.84545351638757, 'weight': 0.4
752178160975092}. Best is trial 26 with value: 0.9336914464359483.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:41,279] Trial 27 finished with value: 0.0 and parameter

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s: {'max_features': 6449, 'C': 0.44232460036683163, 'weight': 0.243304275319
49278}. Best is trial 26 with value: 0.9336914464359483.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:41,734] Trial 28 finished with value: 0.9306437725519473
and parameters: {'max_features': 8047, 'C': 27.355159294819217, 'weight': 0.
410600597267483}. Best is trial 26 with value: 0.9336914464359483.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:42,080] Trial 29 finished with value: 0.0 and parameter
s: {'max_features': 9027, 'C': 3.230459625755039e-05, 'weight': 0.4974218517
8413323}. Best is trial 26 with value: 0.9336914464359483.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:42,414] Trial 30 finished with value: 0.0 and parameter
s: {'max_features': 5938, 'C': 0.02580957872160989, 'weight': 0.452848109120
50766}. Best is trial 26 with value: 0.9336914464359483.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:42,921] Trial 31 finished with value: 0.9348677593688448
and parameters: {'max_features': 8663, 'C': 75.99023884464154, 'weight': 0.5
069817916236027}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:43,422] Trial 32 finished with value: 0.9292620302700275
and parameters: {'max_features': 8432, 'C': 35.35236377623002, 'weight': 0.5
142774958981415}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:43,810] Trial 33 finished with value: 0.8494035723391636
and parameters: {'max_features': 7372, 'C': 4.6219526172364604, 'weight': 0.
33408485884139083}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:44,253] Trial 34 finished with value: 0.9243235584001516
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and parameters: {'max_features': 9161, 'C': 46.97022723276793, 'weight': 0.2
3209173017233536}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:44,657] Trial 35 finished with value: 0.8787515076012479
and parameters: {'max_features': 9376, 'C': 1.7660020469604372, 'weight': 0.
6052157060757148}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:45,030] Trial 36 finished with value: 0.1423023401527073
5 and parameters: {'max_features': 8553, 'C': 0.44735905504996176, 'weight':
0.4362009492907302}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:45,465] Trial 37 finished with value: 0.9129322695241978
and parameters: {'max_features': 8077, 'C': 5.7622158324348005, 'weight': 0.
5113512465546822}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:45,829] Trial 38 finished with value: 0.0 and parameter
s: {'max_features': 7022, 'C': 0.0035282351408565606, 'weight': 0.7131273224
148906}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:46,329] Trial 39 finished with value: 0.9286281691352845
and parameters: {'max_features': 8701, 'C': 29.80679691934384, 'weight': 0.3
9721245338169375}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:46,656] Trial 40 finished with value: 0.0 and parameter
s: {'max_features': 4732, 'C': 0.010363517145589276, 'weight': 0.33341521093
489146}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:47,105] Trial 41 finished with value: 0.9339189905493284

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and parameters: {'max_features': 9248, 'C': 81.278159615318, 'weight': 0.469
30194793609536}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:47,525] Trial 42 finished with value: 0.9331928396072812
and parameters: {'max_features': 9375, 'C': 98.1235586483404, 'weight': 0.45
591514124454796}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:47,956] Trial 43 finished with value: 0.934586154564699
and parameters: {'max_features': 9980, 'C': 61.46189755100571, 'weight': 0.4
620990582556353}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:48,370] Trial 44 finished with value: 0.9327778637116151
and parameters: {'max_features': 7890, 'C': 72.15697213718204, 'weight': 0.4
567192476594423}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:48,870] Trial 45 finished with value: 0.929320790738922
and parameters: {'max_features': 8410, 'C': 80.59587039778441, 'weight': 0.4
2399224104875033}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:49,320] Trial 46 finished with value: 0.9261093355577605
and parameters: {'max_features': 4399, 'C': 9.619907199890354, 'weight': 0.5
401345827763162}. Best is trial 31 with value: 0.9348677593688448.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:49,824] Trial 47 finished with value: 0.9378742369483115
and parameters: {'max_features': 9544, 'C': 49.01425099499282, 'weight': 0.6
188335217167468}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:50,165] Trial 48 finished with value: 0.9183478392862623
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and parameters: {'max_features': 1091, 'C': 3.9939909351029463, 'weight': 0.
6215988112089653}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:50,692] Trial 49 finished with value: 0.9340269553731645
and parameters: {'max_features': 9597, 'C': 45.49094608066835, 'weight': 0.3
8056939133934314}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:51,174] Trial 50 finished with value: 0.9164003668966186
and parameters: {'max_features': 9492, 'C': 12.583725443630332, 'weight': 0.
35571104350025995}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:51,723] Trial 51 finished with value: 0.9340959823593421
and parameters: {'max_features': 8957, 'C': 48.960415213736745, 'weight': 0.
5429118565477035}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:52,325] Trial 52 finished with value: 0.9356563212871531
and parameters: {'max_features': 8942, 'C': 48.285832941830854, 'weight': 0.
5374841586690664}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:52,738] Trial 53 finished with value: 0.8795770393513773
and parameters: {'max_features': 2842, 'C': 7.683895781043388, 'weight': 0.2
894342637139243}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:53,148] Trial 54 finished with value: 0.9371484358605988
and parameters: {'max_features': 9924, 'C': 42.520574520278274, 'weight': 0.
7056744195342551}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:53,481] Trial 55 finished with value: 0.0 and parameter

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s: {'max_features': 9837, 'C': 0.000476364210022397, 'weight': 0.712784308089902}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:53,985] Trial 56 finished with value: 0.9301167607591332 and parameters: {'max_features': 9995, 'C': 17.9406360107562, 'weight': 0.5417347870937382}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:54,433] Trial 57 finished with value: 0.9311373020142948 and parameters: {'max_features': 7610, 'C': 21.109313083868084, 'weight': 0.5935242613668802}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:54,906] Trial 58 finished with value: 0.8837669603446354 and parameters: {'max_features': 8918, 'C': 1.1497751974920671, 'weight': 0.696999936327785}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:55,434] Trial 59 finished with value: 0.9342933377886642 and parameters: {'max_features': 8288, 'C': 47.22144024416713, 'weight': 0.6332035414595001}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:55,897] Trial 60 finished with value: 0.9320214505925346 and parameters: {'max_features': 8292, 'C': 11.296813550748809, 'weight': 0.8036507990638717}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:56,426] Trial 61 finished with value: 0.935180128892147 and parameters: {'max_features': 8837, 'C': 41.45427874208972, 'weight': 0.6365780355382027}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:30:56,870] Trial 62 finished with value: 0.9125686619881666
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and parameters: {'max_features': 9624, 'C': 3.0812838932696307, 'weight': 0.
6569559456719208}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:57,353] Trial 63 finished with value: 0.9341705856943155
and parameters: {'max_features': 8603, 'C': 25.873778929178037, 'weight': 0.
6304007031356844}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:57,779] Trial 64 finished with value: 0.9371696877695778
and parameters: {'max_features': 7824, 'C': 44.526967795229474, 'weight': 0.
6813238762260854}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:58,254] Trial 65 finished with value: 0.9293379268619152
and parameters: {'max_features': 9561, 'C': 6.425751983152039, 'weight': 0.7
347674943031445}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:58,584] Trial 66 finished with value: 0.8862570797754458
and parameters: {'max_features': 210, 'C': 19.25381001104051, 'weight': 0.67
03314540622696}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:59,050] Trial 67 finished with value: 0.9322246922561129
and parameters: {'max_features': 7774, 'C': 39.36819159929063, 'weight': 0.5
667907036232576}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:59,493] Trial 68 finished with value: 0.9324259613744527
and parameters: {'max_features': 7301, 'C': 14.227019041173657, 'weight': 0.
6790042318477435}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:30:59,837] Trial 69 finished with value: 0.0 and parameter

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s: {'max_features': 6113, 'C': 0.09517627435073903, 'weight': 0.614569369105
4166}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:00,278] Trial 70 finished with value: 0.9343090498610854
and parameters: {'max_features': 8860, 'C': 68.71276545989903, 'weight': 0.7
818686473696614}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:00,680] Trial 71 finished with value: 0.9313688618268603
and parameters: {'max_features': 8821, 'C': 61.40744787903443, 'weight': 0.8
426192938515895}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:01,112] Trial 72 finished with value: 0.9366452930230015
and parameters: {'max_features': 9146, 'C': 28.718608643615386, 'weight': 0.
7391109586177942}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:01,584] Trial 73 finished with value: 0.9374272191498614
and parameters: {'max_features': 9202, 'C': 31.05778980396833, 'weight': 0.7
344766493091329}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:02,054] Trial 74 finished with value: 0.9365070757987659
and parameters: {'max_features': 9054, 'C': 29.56484031597128, 'weight': 0.7
288684389277801}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:02,495] Trial 75 finished with value: 0.9358276507267304
and parameters: {'max_features': 9193, 'C': 29.260823880370186, 'weight': 0.
7423797841898062}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:02,930] Trial 76 finished with value: 0.9366676844247032

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and parameters: {'max_features': 9227, 'C': 23.632932290486234, 'weight': 0.7418560810066607}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:31:03,354] Trial 77 finished with value: 0.9366676844247032 and parameters: {'max_features': 9233, 'C': 25.748870620338288, 'weight': 0.7437858452422498}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:31:03,802] Trial 78 finished with value: 0.9306606830758882 and parameters: {'max_features': 9690, 'C': 7.6665797062833185, 'weight': 0.8029460646665221}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:31:04,267] Trial 79 finished with value: 0.9356277367213627 and parameters: {'max_features': 9417, 'C': 16.25887511349376, 'weight': 0.7242369194846677}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:31:04,693] Trial 80 finished with value: 0.9115622469742763 and parameters: {'max_features': 7990, 'C': 1.5807835791916847, 'weight': 0.7611838925436016}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:31:05,119] Trial 81 finished with value: 0.9350552842817613 and parameters: {'max_features': 9127, 'C': 28.117209697655365, 'weight': 0.7530643507599503}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:31:05,503] Trial 82 finished with value: 0.9365070757987659 and parameters: {'max_features': 9225, 'C': 24.119474129358107, 'weight': 0.7060726301496246}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.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 2024-02-11 11:31:05,974] Trial 83 finished with value: 0.9290415767893176
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and parameters: {'max_features': 9336, 'C': 9.538915032710905, 'weight': 0.6
905444416204262}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:06,423] Trial 84 finished with value: 0.9290043290043289
and parameters: {'max_features': 9755, 'C': 4.70812445284151, 'weight': 0.77
83946148415075}. Best is trial 47 with value: 0.9378742369483115.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:06,825] Trial 85 finished with value: 0.9388800375922004
and parameters: {'max_features': 9383, 'C': 22.126715962525623, 'weight': 0.
7076610166510865}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:07,236] Trial 86 finished with value: 0.9147244575775249
and parameters: {'max_features': 8417, 'C': 12.59530060153441, 'weight': 0.8
722255044672803}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:07,620] Trial 87 finished with value: 0.7940019281376717
and parameters: {'max_features': 9511, 'C': 0.24664976430388022, 'weight':
0.7993727659288277}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:08,107] Trial 88 finished with value: 0.937440050869672
and parameters: {'max_features': 9798, 'C': 17.060068879441342, 'weight': 0.
7350094639525949}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:08,469] Trial 89 finished with value: 0.9194645265527814
and parameters: {'max_features': 9810, 'C': 3.3426634437579854, 'weight': 0.
8186527116628273}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:08,936] Trial 90 finished with value: 0.9384140161378237
```

```
and parameters: {'max_features': 9993, 'C': 96.82583488906322, 'weight': 0.7
781712879735121}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:09,441] Trial 91 finished with value: 0.9355422098325412
and parameters: {'max_features': 9948, 'C': 98.46794411574707, 'weight': 0.6
625502514261077}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:09,887] Trial 92 finished with value: 0.9335044040926395
and parameters: {'max_features': 9417, 'C': 18.892236623068275, 'weight': 0.
7816773764180713}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:10,331] Trial 93 finished with value: 0.9388800375922004
and parameters: {'max_features': 9662, 'C': 36.33718164922854, 'weight': 0.6
933513996172989}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:10,804] Trial 94 finished with value: 0.9362962988604657
and parameters: {'max_features': 9770, 'C': 37.74163632394459, 'weight': 0.6
845026858275205}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:11,215] Trial 95 finished with value: 0.9366014608769927
and parameters: {'max_features': 9629, 'C': 55.41456654603397, 'weight': 0.7
144575653715146}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:11,666] Trial 96 finished with value: 0.9322048393630948
and parameters: {'max_features': 8626, 'C': 6.046783612069882, 'weight': 0.7
629204596772017}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:12,064] Trial 97 finished with value: 0.9359903776643523
```

```

and parameters: {'max_features': 9984, 'C': 98.6735904180095, 'weight': 0.70
01969115795088}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:12,416] Trial 98 finished with value: 0.0 and parameter
s: {'max_features': 9320, 'C': 1.1710458306038678e-05, 'weight': 0.655209335
0578261}. Best is trial 85 with value: 0.9388800375922004.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/3743568161.
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 2024-02-11 11:31:12,810] Trial 99 finished with value: 0.934670512446867
and parameters: {'max_features': 5377, 'C': 14.850021472083325, 'weight': 0.
7266506412695661}. Best is trial 85 with value: 0.9388800375922004.

```

```

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': 9383, 'C': 22.126715962525623, 'weight': 0.707661016651086
5}

```

```

In [ ]: study.best_value

```

```

Out[ ]: 0.9388800375922004

```

```

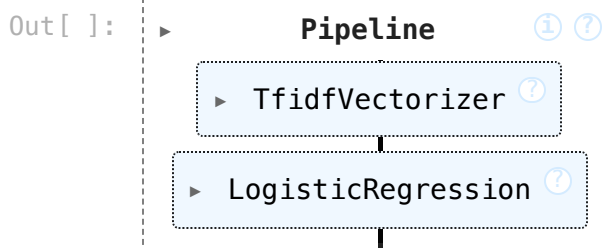
In [ ]: best_classifier_1 = Pipeline([
    ('vectorizer', TfidfVectorizer(analyzer='word', token_pattern=r"[\S]+",
    ('classifier', LogisticRegression(max_iter=10000, C=best_C, class_weight=
    ])

```

```

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: 0.94

Best parameters: {'max_features': 9383, 'C': 22.126715962525623, 'weight': 0.7076610166510865}

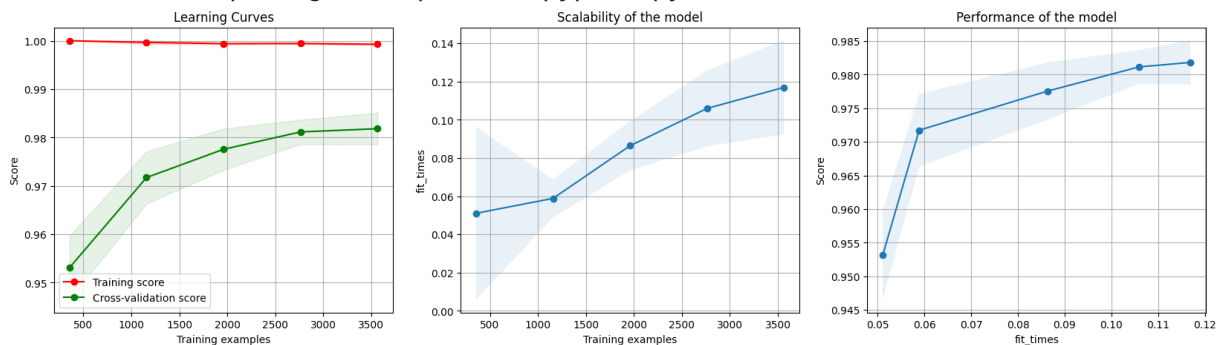
Best estimator: Pipeline(steps=[('vectorizer',
TfidfVectorizer(max_features=9383, token_pattern='[\\S]
+')),
('classifier',
LogisticRegression(C=22.126715962525623,
class_weight={0: 0.2923389833489135,
1: 0.7076610166510865},
max_iter=10000))])

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

```
Out[ ]: {'study_name': 'no-name-86fe8e90-2779-4ba2-9389-7b9367e4b642',  
        '_study_id': 0,  
        '_storage': <optuna.storages._in_memory.InMemoryStorage at 0x29a1c4f10>,  
        '_directions': [<StudyDirection.MAXIMIZE: 2>],  
        'sampler': <optuna.samplers._tpe.sampler.TPESampler at 0x2ab488890>,  
        'pruner': <optuna.pruners._median.MedianPruner at 0x29a1c6350>,  
        '_thread_local': <optuna.study.study._ThreadLocalStudyAttribute at 0x2ac0c  
c110>,  
        '_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	0.98	1.00	0.99	966
1	0.97	0.87	0.92	149
accuracy			0.98	1115
macro avg	0.98	0.93	0.95	1115
weighted avg	0.98	0.98	0.98	1115

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 numpy 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([[ 8.         , 36.         , 29.         , 3.22222222,
  0.         , 1.         , 2.         , 1.         ,
  2.         , 0.         , 0.         , 0.         ],
 [11.         , 59.         , 48.         , 4.         ,
  0.         , 1.         , 3.         , 1.         ,
  1.         , 1.         , 0.         , 0.         ],
 [65.         , 329.        , 268.        , 4.06060606,
  0.         , 6.         , 8.         , 6.         ,
 13.         , 8.         , 3.         , 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 2024-02-11 11:32:33,207] A new study created in memory with name: no-name
-f10143fb-af41-4380-868b-6840adadddb3
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:35,218] Trial 0 finished with value: 0.7573954221349796
and parameters: {'C': 0.22225415908172486, 'weight': 0.3865962111242355}. Be
st is trial 0 with value: 0.7573954221349796.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:36,261] Trial 1 finished with value: 0.7892058220825344
and parameters: {'C': 0.16373317358814418, 'weight': 0.5173852114279398}. Be
st is trial 1 with value: 0.7892058220825344.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:36,556] Trial 2 finished with value: 0.6660168525883023
and parameters: {'C': 0.0016349017791389244, 'weight': 0.4887183201098797}.
Best is trial 1 with value: 0.7892058220825344.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:37,201] Trial 3 finished with value: 0.7550686167096824
and parameters: {'C': 1.4981938997286035, 'weight': 0.3752196037741683}. Bes
t is trial 1 with value: 0.7892058220825344.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:37,726] Trial 4 finished with value: 0.05460523113689506
and parameters: {'C': 7.228296709206527e-05, 'weight': 0.4843105597113294}.
Best is trial 1 with value: 0.7892058220825344.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:37,868] Trial 5 finished with value: 0.5468533273935858
and parameters: {'C': 1.650938855430849e-05, 'weight': 0.8871440421393781}.
Best is trial 1 with value: 0.7892058220825344.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:38,103] Trial 6 finished with value: 0.5645746050480227

```



```

and parameters: {'C': 0.0003506770134678089, 'weight': 0.5434871722275938}.
Best is trial 1 with value: 0.7892058220825344.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:39,038] Trial 7 finished with value: 0.781985761014049 a
nd parameters: {'C': 1.4142963272239408, 'weight': 0.4605240091909798}. Best
is trial 1 with value: 0.7892058220825344.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:40,070] Trial 8 finished with value: 0.8077059429920078
and parameters: {'C': 0.4128400004959824, 'weight': 0.5585154423761708}. Bes
t is trial 8 with value: 0.8077059429920078.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:41,057] Trial 9 finished with value: 0.5525989892342629
and parameters: {'C': 0.8131628211282036, 'weight': 0.17819190139763635}. Be
st is trial 8 with value: 0.8077059429920078.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:42,006] Trial 10 finished with value: 0.8171664873406319
and parameters: {'C': 98.48379458831398, 'weight': 0.7555086867168475}. Best
is trial 10 with value: 0.8171664873406319.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:43,671] Trial 11 finished with value: 0.8194506876304042
and parameters: {'C': 72.90334943907219, 'weight': 0.7466088643312833}. Best
is trial 11 with value: 0.8194506876304042.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:45,243] Trial 12 finished with value: 0.8127826604352221
and parameters: {'C': 43.88296579343812, 'weight': 0.7857699035820721}. Best
is trial 11 with value: 0.8194506876304042.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:45,959] Trial 13 finished with value: 0.8192865443935148

```

```
and parameters: {'C': 50.933867575502646, 'weight': 0.7046010021046342}. Best
is trial 11 with value: 0.8194506876304042.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:46,943] Trial 14 finished with value: 0.8210307564326499
and parameters: {'C': 11.879306368683071, 'weight': 0.6812644065151411}. Best
is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:47,691] Trial 15 finished with value: 0.8145223263801407
and parameters: {'C': 7.202092481767628, 'weight': 0.652159922832411}. Best
is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:48,169] Trial 16 finished with value: 0.7579010412885846
and parameters: {'C': 0.013517747103726956, 'weight': 0.8781118018538387}. B
est is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:49,478] Trial 17 finished with value: 0.8116251815773877
and parameters: {'C': 6.1952197227740236, 'weight': 0.6226196415104046}. Best
is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:51,375] Trial 18 finished with value: 0.805954744750607
and parameters: {'C': 0.017597245376094518, 'weight': 0.7944928435203378}. B
est is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:52,119] Trial 19 finished with value: 0.8115143679992232
and parameters: {'C': 10.095338255133159, 'weight': 0.6354950871255107}. Best
is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:32:53,316] Trial 20 finished with value: 0.5625218344854522
```

```
and parameters: {'C': 6.5720956013772565, 'weight': 0.17996213391273325}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:32:54,187] Trial 21 finished with value: 0.8205605254340327 and parameters: {'C': 28.344679711014688, 'weight': 0.7027680664889602}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:32:54,959] Trial 22 finished with value: 0.8198234836030112 and parameters: {'C': 19.614794054285383, 'weight': 0.7112836113070449}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:32:56,055] Trial 23 finished with value: 0.8197123353379123 and parameters: {'C': 17.599391667445808, 'weight': 0.6853762783029049}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:32:56,887] Trial 24 finished with value: 0.8075583569339839 and parameters: {'C': 0.06386359477006039, 'weight': 0.8312951406643988}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:32:57,810] Trial 25 finished with value: 0.8146241923279233 and parameters: {'C': 1.5489747978337252, 'weight': 0.5833424722646892}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:32:58,596] Trial 26 finished with value: 0.8188666418499165 and parameters: {'C': 27.31921672222896, 'weight': 0.7106212529200765}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:32:59,811] Trial 27 finished with value: 0.8104616912141637
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and parameters: {'C': 4.177531811302634, 'weight': 0.8389271232071651}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:00,682] Trial 28 finished with value: 0.7591869706393949 and parameters: {'C': 0.0028412152392709483, 'weight': 0.605847376822001}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:01,683] Trial 29 finished with value: 0.7550219784861492 and parameters: {'C': 0.20056872476504758, 'weight': 0.3821901210160379}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:02,434] Trial 30 finished with value: 0.7045535765888478 and parameters: {'C': 2.621082400125418, 'weight': 0.27527175510193275}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:03,227] Trial 31 finished with value: 0.8197123353379123 and parameters: {'C': 20.62486109341435, 'weight': 0.6861146233637669}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:04,092] Trial 32 finished with value: 0.8210307564326499 and parameters: {'C': 16.56223544015921, 'weight': 0.68177544116892}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:06,739] Trial 33 finished with value: 0.8135384551605274 and parameters: {'C': 16.122501449379826, 'weight': 0.7729175161439521}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:07,906] Trial 34 finished with value: 0.7749176947020647


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and parameters: {'C': 31.438470715860056, 'weight': 0.4357192245778412}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:08,900] Trial 35 finished with value: 0.820883655336797 and parameters: {'C': 0.06173012790828542, 'weight': 0.7291241365662579}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:09,792] Trial 36 finished with value: 0.8181651844006727 and parameters: {'C': 0.07284143196392334, 'weight': 0.6599680641845396}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:10,491] Trial 37 finished with value: 0.7038783446349748 and parameters: {'C': 0.0020180102802938088, 'weight': 0.5303839059478576}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:11,405] Trial 38 finished with value: 0.77578314294579 and parameters: {'C': 0.008081194233834453, 'weight': 0.8259922380150753}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:11,840] Trial 39 finished with value: 0.6412817643063211 and parameters: {'C': 0.0005196511366427317, 'weight': 0.578685324363937}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:12,905] Trial 40 finished with value: 0.8185603297647861 and parameters: {'C': 0.5936942791987548, 'weight': 0.7482843431734061}. Best is trial 14 with value: 0.8210307564326499.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:14,129] Trial 41 finished with value: 0.8220736811835 and
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d parameters: {'C': 2.8046144574934373, 'weight': 0.7227220280176999}. Best
is trial 41 with value: 0.8220736811835.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:16,662] Trial 42 finished with value: 0.8224323383223464
and parameters: {'C': 2.1248857446899114, 'weight': 0.7167986099049775}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:18,864] Trial 43 finished with value: 0.8198690569685143
and parameters: {'C': 2.3091596685813838, 'weight': 0.742841335677932}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:20,882] Trial 44 finished with value: 0.7850827171481688
and parameters: {'C': 0.35007246867884323, 'weight': 0.496162951663515}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:22,836] Trial 45 finished with value: 0.80825389659514 a
nd parameters: {'C': 1.1057450631946508, 'weight': 0.8081330517752343}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:23,725] Trial 46 finished with value: 0.7715357347569756
and parameters: {'C': 0.07173409703751396, 'weight': 0.8982541225327252}. Be
st is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:23,959] Trial 47 finished with value: 0.4749250253931166
and parameters: {'C': 1.2843179380452099e-05, 'weight': 0.64839129622829}. B
est is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:26,724] Trial 48 finished with value: 0.8026481241796478
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and parameters: {'C': 3.1636971268119325, 'weight': 0.8638165287061561}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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/rel
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-11 11:33:29,120] Trial 49 finished with value: 0.8222656746288844
and parameters: {'C': 0.15532310497317092, 'weight': 0.7318857831670148}. Be
st is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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/rel
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-11 11:33:30,141] Trial 50 finished with value: 0.8100389726431662
and parameters: {'C': 0.153190005879869, 'weight': 0.6035068584666695}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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/rel
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-11 11:33:31,772] Trial 51 finished with value: 0.8185603297647861
and parameters: {'C': 0.35899022646775697, 'weight': 0.7529210880240723}. Be
st is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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/rel
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-11 11:33:32,831] Trial 52 finished with value: 0.8152956493146457
and parameters: {'C': 0.034250013473333646, 'weight': 0.727291697868846}. Be
st is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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/rel
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-11 11:33:34,790] Trial 53 finished with value: 0.8171226080793763
and parameters: {'C': 0.736557381059311, 'weight': 0.6617178981889542}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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/rel
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-11 11:33:35,849] Trial 54 finished with value: 0.816373179751344
and parameters: {'C': 11.769195067985528, 'weight': 0.7741019621252917}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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/rel
ases/tag/v3.0.0. Use suggest_float(..., log=True) instead.
C = trial.suggest_loguniform('C', 1e-5, 100)
[I 2024-02-11 11:33:37,694] Trial 55 finished with value: 0.8150868633880286
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and parameters: {'C': 0.12312480695807757, 'weight': 0.68501555465945}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:38,676] Trial 56 finished with value: 0.8109457501392047 and parameters: {'C': 87.9021547433516, 'weight': 0.7982964745481411}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:39,453] Trial 57 finished with value: 0.8087824053175299 and parameters: {'C': 4.72458490443042, 'weight': 0.5605597783660949}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:40,218] Trial 58 finished with value: 0.8220736811835 and parameters: {'C': 1.8822734756883426, 'weight': 0.7229416670433598}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:41,318] Trial 59 finished with value: 0.8192154650653153 and parameters: {'C': 9.450055661843173, 'weight': 0.6754395441191364}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:42,332] Trial 60 finished with value: 0.8224323383223464 and parameters: {'C': 1.8304870002968343, 'weight': 0.716256561342512}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:43,286] Trial 61 finished with value: 0.8109862868318402 and parameters: {'C': 1.4446926902834845, 'weight': 0.6196783719715184}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:44,485] Trial 62 finished with value: 0.8224323383223464


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and parameters: {'C': 2.18699881309442, 'weight': 0.7175988557898028}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:45,393] Trial 63 finished with value: 0.814196141873991
and parameters: {'C': 1.7736765995269326, 'weight': 0.7711938499394981}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:46,644] Trial 64 finished with value: 0.8224257015212846
and parameters: {'C': 0.5106717715428745, 'weight': 0.7192325967813578}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:47,985] Trial 65 finished with value: 0.8214943487530555
and parameters: {'C': 0.4856921412395858, 'weight': 0.725300347472929}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:48,855] Trial 66 finished with value: 0.8091265533501497
and parameters: {'C': 1.0246974275846166, 'weight': 0.8100486831852929}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:49,645] Trial 67 finished with value: 0.8046893608676943
and parameters: {'C': 0.3193382186675374, 'weight': 0.8546162957748695}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:50,300] Trial 68 finished with value: 0.7287155101056264
and parameters: {'C': 3.370875124224262, 'weight': 0.31285798238548534}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:33:51,066] Trial 69 finished with value: 0.8145880496824868
```

and parameters: {'C': 0.22503547869557244, 'weight': 0.6411219142778125}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:51,915] Trial 70 finished with value: 0.8186391944822141 and parameters: {'C': 0.734110834939491, 'weight': 0.705286548200589}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:52,957] Trial 71 finished with value: 0.8214943487530555 and parameters: {'C': 0.5421714227491425, 'weight': 0.7241707204717681}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:54,019] Trial 72 finished with value: 0.816501215230622 and parameters: {'C': 2.0336787632117646, 'weight': 0.7632263734097663}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:54,892] Trial 73 finished with value: 0.8211544970305823 and parameters: {'C': 5.478111598027671, 'weight': 0.7342847177172712}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:55,901] Trial 74 finished with value: 0.8210347475524085 and parameters: {'C': 0.805385718219664, 'weight': 0.6936640656779026}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:56,707] Trial 75 finished with value: 0.4541987577163392 and parameters: {'C': 0.23667535148514846, 'weight': 0.13016023158867052}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:57,679] Trial 76 finished with value: 0.814767510804152

and parameters: {'C': 0.5039878738077507, 'weight': 0.7856499696859962}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:58,028] Trial 77 finished with value: 0.6069053559428579 and parameters: {'C': 3.54463777169721e-05, 'weight': 0.7176837050118505}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:33:59,881] Trial 78 finished with value: 0.8164658303297634 and parameters: {'C': 0.11546270004828785, 'weight': 0.6706074644200144}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:34:00,755] Trial 79 finished with value: 0.8109355679854076 and parameters: {'C': 1.090822551180566, 'weight': 0.6244436643762845}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:34:01,927] Trial 80 finished with value: 0.7812774490154146 and parameters: {'C': 2.303637698581373, 'weight': 0.46256762693146025}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:34:03,049] Trial 81 finished with value: 0.8224257015212846 and parameters: {'C': 0.5309963115218352, 'weight': 0.7204201723591368}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:34:04,861] Trial 82 finished with value: 0.8185603297647861 and parameters: {'C': 1.2940531642584086, 'weight': 0.748918979338447}. Best is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.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 2024-02-11 11:34:06,691] Trial 83 finished with value: 0.8201953653023356

```

and parameters: {'C': 7.063493580332975, 'weight': 0.7075049895803178}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:08,863] Trial 84 finished with value: 0.8118864231505176
and parameters: {'C': 0.41466446173139054, 'weight': 0.8188089454118422}. Be
st is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:10,960] Trial 85 finished with value: 0.8134225977474852
and parameters: {'C': 3.619528829306321, 'weight': 0.7843483212659256}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:12,033] Trial 86 finished with value: 0.8193370575998815
and parameters: {'C': 0.03671483191652395, 'weight': 0.7436173999266166}. Be
st is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:13,845] Trial 87 finished with value: 0.8175221953437839
and parameters: {'C': 0.2819389695492888, 'weight': 0.6580163412617801}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:15,254] Trial 88 finished with value: 0.8200984276198829
and parameters: {'C': 0.09994022696824022, 'weight': 0.7173016808456494}. Be
st is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:16,846] Trial 89 finished with value: 0.8197036491746305
and parameters: {'C': 0.18444724170355292, 'weight': 0.6989616495634955}. Be
st is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:18,846] Trial 90 finished with value: 0.8092587954286206

```



```
and parameters: {'C': 1.7377541898958206, 'weight': 0.84081820979773}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:20,255] Trial 91 finished with value: 0.8218325523941321
and parameters: {'C': 0.5870872258048444, 'weight': 0.7296818511530048}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:20,999] Trial 92 finished with value: 0.8185055764772613
and parameters: {'C': 0.5009671822487536, 'weight': 0.7600230572200294}. Bes
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:21,855] Trial 93 finished with value: 0.8211544970305823
and parameters: {'C': 2.563212913309882, 'weight': 0.7366069510227804}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:22,860] Trial 94 finished with value: 0.8187476183440514
and parameters: {'C': 0.757590634992614, 'weight': 0.6851029869218531}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:23,951] Trial 95 finished with value: 0.8115317988190677
and parameters: {'C': 1.041387990793532, 'weight': 0.7923871627831668}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:24,887] Trial 96 finished with value: 0.8128590580553627
and parameters: {'C': 4.548556813279889, 'weight': 0.6399016476020347}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:26,157] Trial 97 finished with value: 0.816501215230622
```

```

and parameters: {'C': 2.9270853442799454, 'weight': 0.7648261111929909}. Best
t is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:27,058] Trial 98 finished with value: 0.820773434323234
and parameters: {'C': 8.856005648655541, 'weight': 0.7261282831445939}. Best
is trial 42 with value: 0.8224323383223464.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2325454625.
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 2024-02-11 11:34:28,163] Trial 99 finished with value: 0.819756796267869
and parameters: {'C': 0.4219097639978284, 'weight': 0.6649434818399066}. Best
t is trial 42 with value: 0.8224323383223464.

```

```

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': 2.1248857446899114, 'weight': 0.7167986099049775}

```

```

In [ ]: study.best_value

```

```

Out[ ]: 0.8224323383223464

```

```

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 ⓘ

```

```

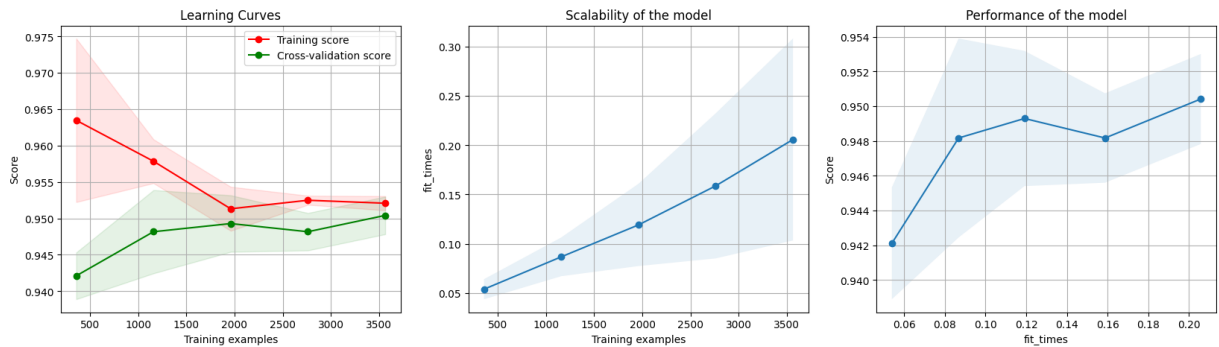
In [ ]: plot_learning_curve(best_classifier_2, 'Learning Curves',
    X_train_features, y_train, n_jobs=-1)

```

```

Out[ ]: <module 'matplotlib.pyplot' from '/opt/homebrew/anaconda3/envs/nlp/lib/pyth
on3.11/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	0.98	0.97	0.98	966
1	0.83	0.86	0.84	149
accuracy			0.96	1115
macro avg	0.90	0.92	0.91	1115
weighted avg	0.96	0.96	0.96	1115

```
In [ ]: X_train_features
```

```
Out[ ]: array([[ 8., 36., 29., ..., 0., 0., 0.],
               [11., 59., 48., ..., 1., 0., 0.],
               [65., 329., 268., ..., 8., 3., 0.],
               ...,
               [ 2., 16., 15., ..., 0., 0., 0.],
               [ 7., 22., 17., ..., 0., 0., 0.],
               [27., 144., 118., ..., 2., 0., 0.]])
```

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

```
Out[ ]: ['aight want money',
         'home love awake love kiss',
         'happen r 2waxsto wat want come ill medical insurance able deliver basic c
         are currently shop right medical insurance til friday morning s major perso
         n guide right insurance']
```

```
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[ ]: (4457, 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	aight want money	8.0	36.0	29.0	3.5
1	home love awake love kiss	11.0	59.0	48.0	5.4
2	happen r 2waxsto wat want come ill medical ins...	65.0	329.0	268.0	4.2
3	oh thkin goin yogasana 10 den nd 3 den rush pa...	30.0	125.0	96.0	4.2
4	good day busy tomorrow night	17.0	80.0	64.0	4.7

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):
```



```
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 2024-02-11 11:35:23,326] A new study created in memory with name: no-name
-d39684b6-ea00-4df9-9627-452f5f5a1f6e
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:26,602] Trial 0 finished with value: 0.796681472311301 a
nd parameters: {'C': 5.585840841865493, 'combined_features__tfidf__tfidf__ma
x_features': 3744, 'weight': 0.18103095518901027}. Best is trial 0 with valu
e: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:28,613] Trial 1 finished with value: 0.796681472311301 a
nd parameters: {'C': 4.11735100621018e-05, 'combined_features__tfidf__tfidf_
__max_features': 1361, 'weight': 0.6964219141037292}. Best is trial 0 with va
lue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:30,647] Trial 2 finished with value: 0.796681472311301 a
nd parameters: {'C': 0.0054191007650991035, 'combined_features__tfidf__tfidf_
__max_features': 4498, 'weight': 0.5788388400116729}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:32,511] Trial 3 finished with value: 0.796681472311301 a
nd parameters: {'C': 4.086161983386859e-05, 'combined_features__tfidf__tfidf_
__max_features': 7850, 'weight': 0.3648217214657794}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:35,205] Trial 4 finished with value: 0.796681472311301 a
nd parameters: {'C': 4.420197771720438e-05, 'combined_features__tfidf__tfidf_
__max_features': 1019, 'weight': 0.37653440108862013}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:37,321] Trial 5 finished with value: 0.796681472311301 a
nd parameters: {'C': 0.15699691712209843, 'combined_features__tfidf__tfidf__
max_features': 498, 'weight': 0.6982542177776572}. Best is trial 0 with valu
e: 0.796681472311301.
```



```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:35:39,234] Trial 6 finished with value: 0.796681472311301 and parameters: {'C': 6.210354692295412e-05, 'combined_features__tfidf__tfidf__max_features': 8979, 'weight': 0.20421381567255725}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:35:41,784] Trial 7 finished with value: 0.796681472311301 and parameters: {'C': 0.024097746170356944, 'combined_features__tfidf__tfidf__max_features': 9346, 'weight': 0.667430814296339}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:35:44,134] Trial 8 finished with value: 0.796681472311301 and parameters: {'C': 2.3242199092583784e-05, 'combined_features__tfidf__tfidf__max_features': 5796, 'weight': 0.3082661334990786}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:35:46,092] Trial 9 finished with value: 0.796681472311301 and parameters: {'C': 6.681283354852688e-05, 'combined_features__tfidf__tfidf__max_features': 6157, 'weight': 0.19860578971790155}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:35:47,951] Trial 10 finished with value: 0.796681472311301 and parameters: {'C': 55.248858384751465, 'combined_features__tfidf__tfidf__max_features': 3414, 'weight': 0.10008420159925853}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:35:50,353] Trial 11 finished with value: 0.796681472311301 and parameters: {'C': 7.483026341502262, 'combined_features__tfidf__tfidf__max_features': 2497, 'weight': 0.7726968892472882}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:35:52,403] Trial 12 finished with value: 0.796681472311301
and parameters: {'C': 0.5939760386905908, 'combined_features__tfidf__tfidf__
max_features': 2171, 'weight': 0.5015874828244788}. Best is trial 0 with val
ue: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:54,368] Trial 13 finished with value: 0.796681472311301
and parameters: {'C': 0.0014871625530014957, 'combined_features__tfidf__tfid
f__max_features': 4191, 'weight': 0.8214217355335343}. Best is trial 0 with
value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:56,701] Trial 14 finished with value: 0.796681472311301
and parameters: {'C': 3.6472215736449494, 'combined_features__tfidf__tfidf__
max_features': 2015, 'weight': 0.5419130781736905}. Best is trial 0 with val
ue: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:35:58,985] Trial 15 finished with value: 0.796681472311301
and parameters: {'C': 0.0013829631419311475, 'combined_features__tfidf__tfid
f__max_features': 3286, 'weight': 0.6358041041660426}. Best is trial 0 with
value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:01,436] Trial 16 finished with value: 0.796681472311301
and parameters: {'C': 0.21764813843208072, 'combined_features__tfidf__tfidf__
_max_features': 329, 'weight': 0.8673597565612654}. Best is trial 0 with val
ue: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:04,159] Trial 17 finished with value: 0.796681472311301
and parameters: {'C': 36.19967309590612, 'combined_features__tfidf__tfidf__m
ax_features': 6462, 'weight': 0.41292744552783367}. Best is trial 0 with val
ue: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:06,829] Trial 18 finished with value: 0.796681472311301
and parameters: {'C': 2.288754484353879, 'combined_features__tfidf__tfidf__m
ax_features': 1465, 'weight': 0.45258751197261826}. Best is trial 0 with val
ue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:09,445] Trial 19 finished with value: 0.796681472311301
and parameters: {'C': 0.03221913579078546, 'combined_features__tfidf__tfidf__
_max_features': 3311, 'weight': 0.7448534831120938}. Best is trial 0 with va
lue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:11,716] Trial 20 finished with value: 0.796681472311301
and parameters: {'C': 0.0009801045888591584, 'combined_features__tfidf__tfidf
f__max_features': 5145, 'weight': 0.22740124875334988}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:13,719] Trial 21 finished with value: 0.796681472311301
and parameters: {'C': 0.008343341500085373, 'combined_features__tfidf__tfidf
__max_features': 4475, 'weight': 0.5789555192289036}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:16,091] Trial 22 finished with value: 0.796681472311301
and parameters: {'C': 0.00026747230386677814, 'combined_features__tfidf__tfi
df__max_features': 4172, 'weight': 0.5985006722303063}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:18,591] Trial 23 finished with value: 0.796681472311301
and parameters: {'C': 0.006795549532589112, 'combined_features__tfidf__tfidf
__max_features': 6767, 'weight': 0.4889896057771736}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:20,837] Trial 24 finished with value: 0.796681472311301

```

```
and parameters: {'C': 0.0002676000671861364, 'combined_features__tfidf__tfidf__max_features': 5326, 'weight': 0.6977696269418934}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:36:23,300] Trial 25 finished with value: 0.796681472311301 and parameters: {'C': 0.05603771761626207, 'combined_features__tfidf__tfidf__max_features': 7382, 'weight': 0.12011567758784264}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:36:25,194] Trial 26 finished with value: 0.796681472311301 and parameters: {'C': 1.0264037732561322, 'combined_features__tfidf__tfidf__max_features': 2757, 'weight': 0.3140274701021647}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:36:27,166] Trial 27 finished with value: 0.796681472311301 and parameters: {'C': 15.972892110476328, 'combined_features__tfidf__tfidf__max_features': 4793, 'weight': 0.5476597540831314}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:36:29,546] Trial 28 finished with value: 0.796681472311301 and parameters: {'C': 1.0031452721730385e-05, 'combined_features__tfidf__tfidf__max_features': 1453, 'weight': 0.7608552966504232}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:36:31,972] Trial 29 finished with value: 0.796681472311301 and parameters: {'C': 0.0048554833568022525, 'combined_features__tfidf__tfidf__max_features': 8049, 'weight': 0.6190807476837812}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:36:34,182] Trial 30 finished with value: 0.796681472311301 and parameters: {'C': 0.00016140644576277858, 'combined_features__tfidf__tfidf__max_features': 3768, 'weight': 0.2986352384213774}. Best is trial 0 with
```



```
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:36,184] Trial 31 finished with value: 0.796681472311301
and parameters: {'C': 1.1682891937809668e-05, 'combined_features__tfidf__tfi
df__max_features': 9874, 'weight': 0.36169852528190427}. Best is trial 0 wit
h value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:39,014] Trial 32 finished with value: 0.796681472311301
and parameters: {'C': 0.00010960924277058268, 'combined_features__tfidf__tfi
df__max_features': 942, 'weight': 0.37197490521974585}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:41,228] Trial 33 finished with value: 0.796681472311301
and parameters: {'C': 0.0005658214065902951, 'combined_features__tfidf__tfid
f__max_features': 7757, 'weight': 0.16891637526766967}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:43,270] Trial 34 finished with value: 0.796681472311301
and parameters: {'C': 4.327790473996581e-05, 'combined_features__tfidf__tfid
f__max_features': 8388, 'weight': 0.2557547485799413}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:45,643] Trial 35 finished with value: 0.796681472311301
and parameters: {'C': 0.15715672635550965, 'combined_features__tfidf__tfidf
__max_features': 5670, 'weight': 0.6551065143416926}. Best is trial 0 with va
lue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:47,849] Trial 36 finished with value: 0.796681472311301
and parameters: {'C': 3.266672080254576e-05, 'combined_features__tfidf__tfi
df__max_features': 6790, 'weight': 0.45482558423500363}. Best is trial 0 wit
h value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
```



```
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 2024-02-11 11:36:49,748] Trial 37 finished with value: 0.796681472311301
and parameters: {'C': 0.014534252907644206, 'combined_features__tfidf__tfidf
__max_features': 8831, 'weight': 0.6769629061253102}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:51,696] Trial 38 finished with value: 0.796681472311301
and parameters: {'C': 0.002947162935197496, 'combined_features__tfidf__tfidf
__max_features': 2789, 'weight': 0.1480896672759929}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:54,572] Trial 39 finished with value: 0.796681472311301
and parameters: {'C': 0.0003471147731730733, 'combined_features__tfidf__tfidf
__max_features': 5792, 'weight': 0.724555626050754}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:57,179] Trial 40 finished with value: 0.796681472311301
and parameters: {'C': 6.88678346187834e-05, 'combined_features__tfidf__tfidf
__max_features': 898, 'weight': 0.8072180875872688}. Best is trial 0 with va
lue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:36:59,946] Trial 41 finished with value: 0.796681472311301
and parameters: {'C': 2.130290198313782e-05, 'combined_features__tfidf__tfidf
__max_features': 1717, 'weight': 0.38343128030332674}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:37:02,661] Trial 42 finished with value: 0.796681472311301
and parameters: {'C': 8.235395673267509e-05, 'combined_features__tfidf__tfidf
__max_features': 2310, 'weight': 0.2810427471919545}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:37:04,876] Trial 43 finished with value: 0.796681472311301
and parameters: {'C': 2.1958009705678463e-05, 'combined_features__tfidf__tfidf__max_features': 215, 'weight': 0.5076853930931543}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:07,148] Trial 44 finished with value: 0.796681472311301
and parameters: {'C': 90.06819925110472, 'combined_features__tfidf__tfidf__max_features': 1006, 'weight': 0.33628153597832466}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:09,091] Trial 45 finished with value: 0.796681472311301
and parameters: {'C': 0.41988522045773224, 'combined_features__tfidf__tfidf__max_features': 3792, 'weight': 0.21476349245457202}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:11,780] Trial 46 finished with value: 0.796681472311301
and parameters: {'C': 0.057761620159961925, 'combined_features__tfidf__tfidf__max_features': 2818, 'weight': 0.43028871969345944}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:14,045] Trial 47 finished with value: 0.796681472311301
and parameters: {'C': 0.0007808027851991568, 'combined_features__tfidf__tfidf__max_features': 1799, 'weight': 0.5525608254207769}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:16,330] Trial 48 finished with value: 0.796681472311301
and parameters: {'C': 0.0024430897949037998, 'combined_features__tfidf__tfidf__max_features': 596, 'weight': 0.2585231247836266}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:18,607] Trial 49 finished with value: 0.796681472311301
and parameters: {'C': 10.556166492081365, 'combined_features__tfidf__tfidf__
max_features': 4434, 'weight': 0.8956420403242601}. Best is trial 0 with val
ue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:37:20,856] Trial 50 finished with value: 0.796681472311301
and parameters: {'C': 0.00014464300186540786, 'combined_features__tfidf__tfi
df__max_features': 6154, 'weight': 0.5030039430825238}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:37:22,870] Trial 51 finished with value: 0.796681472311301
and parameters: {'C': 3.969586079958851, 'combined_features__tfidf__tfidf__m
ax_features': 1329, 'weight': 0.707939242355681}. Best is trial 0 with valu
e: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:37:25,270] Trial 52 finished with value: 0.796681472311301
and parameters: {'C': 0.13855822158806505, 'combined_features__tfidf__tfidf__
_max_features': 2087, 'weight': 0.7989356272323087}. Best is trial 0 with va
lue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:37:27,402] Trial 53 finished with value: 0.796681472311301
and parameters: {'C': 2.026272853134546, 'combined_features__tfidf__tfidf__m
ax_features': 561, 'weight': 0.6205508180787034}. Best is trial 0 with valu
e: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:37:29,425] Trial 54 finished with value: 0.796681472311301
and parameters: {'C': 0.3848423821448594, 'combined_features__tfidf__tfidf__
max_features': 3618, 'weight': 0.664773918539268}. Best is trial 0 with valu
e: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:37:31,631] Trial 55 finished with value: 0.796681472311301
and parameters: {'C': 30.486354503938966, 'combined_features__tfidf__tfidf__
```

```
max_features': 4903, 'weight': 0.8439296263906046}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:35,308] Trial 56 finished with value: 0.796681472311301 and parameters: {'C': 0.01896731899610929, 'combined_features__tfidf__tfidf__max_features': 119, 'weight': 0.4720424254513152}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:45,633] Trial 57 finished with value: 0.796681472311301 and parameters: {'C': 4.6440737333792244e-05, 'combined_features__tfidf__tfidf__max_features': 3101, 'weight': 0.5774240108670521}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:51,445] Trial 58 finished with value: 0.796681472311301 and parameters: {'C': 1.2753359552952166, 'combined_features__tfidf__tfidf__max_features': 5372, 'weight': 0.4013194083893413}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:54,796] Trial 59 finished with value: 0.796681472311301 and parameters: {'C': 0.00044445526058240434, 'combined_features__tfidf__tfidf__max_features': 4103, 'weight': 0.7677974573112458}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:37:59,053] Trial 60 finished with value: 0.796681472311301 and parameters: {'C': 0.03605976988901588, 'combined_features__tfidf__tfidf__max_features': 1243, 'weight': 0.7252214188357691}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:01,532] Trial 61 finished with value: 0.796681472311301 and parameters: {'C': 1.5496270767549755e-05, 'combined_features__tfidf__tfidf__max_features': 9659, 'weight': 0.1886073153226805}. Best is trial 0 with value: 0.796681472311301.
```


/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:03,635] Trial 62 finished with value: 0.796681472311301
and parameters: {'C': 0.00019657570855196167, 'combined_features__tfidf__tfidf__max_features': 9065, 'weight': 0.10866893343436457}. Best is trial 0 with value: 0.796681472311301.
```

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:07,057] Trial 63 finished with value: 0.796681472311301
and parameters: {'C': 4.961618153186766e-05, 'combined_features__tfidf__tfidf__max_features': 8642, 'weight': 0.24095084670476802}. Best is trial 0 with value: 0.796681472311301.
```

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:09,555] Trial 64 finished with value: 0.796681472311301
and parameters: {'C': 9.994947939151721e-05, 'combined_features__tfidf__tfidf__max_features': 7211, 'weight': 0.1512368617039768}. Best is trial 0 with value: 0.796681472311301.
```

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:12,426] Trial 65 finished with value: 0.796681472311301
and parameters: {'C': 2.6028401593446966e-05, 'combined_features__tfidf__tfidf__max_features': 574, 'weight': 0.3373004814464275}. Best is trial 0 with value: 0.796681472311301.
```

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:15,286] Trial 66 finished with value: 0.796681472311301
and parameters: {'C': 0.0014343471393427928, 'combined_features__tfidf__tfidf__max_features': 8131, 'weight': 0.6377993306054835}. Best is trial 0 with value: 0.796681472311301.
```

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:17,297] Trial 67 finished with value: 0.796681472311301
and parameters: {'C': 0.08350127568391588, 'combined_features__tfidf__tfidf__max_features': 9345, 'weight': 0.5233658164664524}. Best is trial 0 with value: 0.796681472311301.
```

/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:19,139] Trial 68 finished with value: 0.796681472311301
and parameters: {'C': 0.00025467220019960435, 'combined_features__tfidf__tfidf__max_features': 1740, 'weight': 0.1892255158427485}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:21,867] Trial 69 finished with value: 0.796681472311301
and parameters: {'C': 0.009086133196593408, 'combined_features__tfidf__tfidf__max_features': 2503, 'weight': 0.5945467067060378}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:24,820] Trial 70 finished with value: 0.796681472311301
and parameters: {'C': 1.534230998196317e-05, 'combined_features__tfidf__tfidf__max_features': 7376, 'weight': 0.2120857480265199}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:26,918] Trial 71 finished with value: 0.796681472311301
and parameters: {'C': 0.012039814059162567, 'combined_features__tfidf__tfidf__max_features': 9357, 'weight': 0.6895185674175464}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:29,114] Trial 72 finished with value: 0.796681472311301
and parameters: {'C': 3.7356813248057444e-05, 'combined_features__tfidf__tfidf__max_features': 4628, 'weight': 0.644479194479594}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:32,137] Trial 73 finished with value: 0.796681472311301
and parameters: {'C': 0.004495906722308936, 'combined_features__tfidf__tfidf__max_features': 9983, 'weight': 0.13952503153166496}. Best is trial 0 with value: 0.796681472311301.
```

```
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:34,137] Trial 74 finished with value: 0.796681472311301
and parameters: {'C': 0.02412540765099734, 'combined_features__tfidf__tfidf__
_max_features': 8558, 'weight': 0.7418701649371636}. Best is trial 0 with va
lue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:38:36,670] Trial 75 finished with value: 0.796681472311301
and parameters: {'C': 5.398554351562389, 'combined_features__tfidf__tfidf__m
ax_features': 9122, 'weight': 0.6140074251931485}. Best is trial 0 with valu
e: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:38:39,817] Trial 76 finished with value: 0.796681472311301
and parameters: {'C': 0.28523992802324155, 'combined_features__tfidf__tfidf__
_max_features': 9623, 'weight': 0.5681884660016215}. Best is trial 0 with va
lue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:38:42,013] Trial 77 finished with value: 0.796681472311301
and parameters: {'C': 0.766761306558789, 'combined_features__tfidf__tfidf__m
ax_features': 6182, 'weight': 0.43178130264720216}. Best is trial 0 with val
ue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:38:44,646] Trial 78 finished with value: 0.796681472311301
and parameters: {'C': 0.00012051718261950597, 'combined_features__tfidf__tfi
df__max_features': 8120, 'weight': 0.2821909458301429}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:38:46,804] Trial 79 finished with value: 0.796681472311301
and parameters: {'C': 6.041962135542097e-05, 'combined_features__tfidf__tfid
f__max_features': 870, 'weight': 0.6792130266043224}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:38:48,934] Trial 80 finished with value: 0.796681472311301

```

```
and parameters: {'C': 0.10245113929835593, 'combined_features__tfidf__tfidf__max_features': 7641, 'weight': 0.3227017755787974}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:51,157] Trial 81 finished with value: 0.796681472311301 and parameters: {'C': 2.995580240282659e-05, 'combined_features__tfidf__tfidf__max_features': 6693, 'weight': 0.3543154169121444}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:53,601] Trial 82 finished with value: 0.796681472311301 and parameters: {'C': 1.3479470114158801e-05, 'combined_features__tfidf__tfidf__max_features': 5248, 'weight': 0.38157403849506455}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:55,683] Trial 83 finished with value: 0.796681472311301 and parameters: {'C': 8.54778943855702e-05, 'combined_features__tfidf__tfidf__max_features': 3949, 'weight': 0.2979622892346613}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:57,771] Trial 84 finished with value: 0.796681472311301 and parameters: {'C': 1.7946440029127685e-05, 'combined_features__tfidf__tfidf__max_features': 5689, 'weight': 0.2294200176814515}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:38:59,879] Trial 85 finished with value: 0.796681472311301 and parameters: {'C': 0.05408056818778728, 'combined_features__tfidf__tfidf__max_features': 4360, 'weight': 0.16897932189295395}. Best is trial 0 with value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.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 2024-02-11 11:39:02,419] Trial 86 finished with value: 0.796681472311301 and parameters: {'C': 27.14228790668833, 'combined_features__tfidf__tfidf__max_features': 3429, 'weight': 0.7081957531354307}. Best is trial 0 with value: 0.796681472311301.
```

```

e: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:05,238] Trial 87 finished with value: 0.796681472311301
and parameters: {'C': 1.0689191666437554e-05, 'combined_features__tfidf__tfid
f__max_features': 1221, 'weight': 0.26063542833468795}. Best is trial 0 wit
h value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:07,920] Trial 88 finished with value: 0.796681472311301
and parameters: {'C': 6.250621097144866e-05, 'combined_features__tfidf__tfid
f__max_features': 7104, 'weight': 0.795023432931512}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:10,486] Trial 89 finished with value: 0.796681472311301
and parameters: {'C': 3.256259383723835e-05, 'combined_features__tfidf__tfid
f__max_features': 472, 'weight': 0.6580602359502399}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:13,208] Trial 90 finished with value: 0.796681472311301
and parameters: {'C': 0.002263655427339635, 'combined_features__tfidf__tfid
f__max_features': 3079, 'weight': 0.5297898688089053}. Best is trial 0 with v
alue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:15,419] Trial 91 finished with value: 0.796681472311301
and parameters: {'C': 0.0007663333763172091, 'combined_features__tfidf__tfid
f__max_features': 6088, 'weight': 0.2054500912898244}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:17,633] Trial 92 finished with value: 0.796681472311301
and parameters: {'C': 0.00017369992828432558, 'combined_features__tfidf__tfi
df__max_features': 5002, 'weight': 0.16751561804034346}. Best is trial 0 wit
h value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.

```



```

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 2024-02-11 11:39:19,700] Trial 93 finished with value: 0.796681472311301
and parameters: {'C': 2.2936361970778077e-05, 'combined_features__tfidf__tfid
f__max_features': 4735, 'weight': 0.7435363223981525}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:22,242] Trial 94 finished with value: 0.796681472311301
and parameters: {'C': 0.0003802828300998511, 'combined_features__tfidf__tfid
f__max_features': 6467, 'weight': 0.40390281229490266}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:24,475] Trial 95 finished with value: 0.796681472311301
and parameters: {'C': 5.307969171597965e-05, 'combined_features__tfidf__tfid
f__max_features': 8937, 'weight': 0.12139807426575333}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:27,396] Trial 96 finished with value: 0.796681472311301
and parameters: {'C': 9.754102071752067e-05, 'combined_features__tfidf__tfid
f__max_features': 5913, 'weight': 0.28051078673937857}. Best is trial 0 with
value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:33,001] Trial 97 finished with value: 0.796681472311301
and parameters: {'C': 0.00024146701632641975, 'combined_features__tfidf__tfid
f__max_features': 7783, 'weight': 0.19326956294508543}. Best is trial 0 wit
h value: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:37,694] Trial 98 finished with value: 0.796681472311301
and parameters: {'C': 2.0912219938060113, 'combined_features__tfidf__tfidf__
max_features': 1566, 'weight': 0.2441700602875776}. Best is trial 0 with val
ue: 0.796681472311301.
/var/folders/3d/fk1zpy415g31bg07yrkc5qbm0000gn/T/ipykernel_43880/2587201369.
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 2024-02-11 11:39:40,732] Trial 99 finished with value: 0.796681472311301  
and parameters: {'C': 13.717227438449195, 'combined_features__tfidf__tfidf__  
max_features': 776, 'weight': 0.3042510936273354}. Best is trial 0 with valu  
e: 0.796681472311301.
```

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

```
Out[ ]: {'C': 5.585840841865493,  
        'combined_features__tfidf__tfidf__max_features': 3744,  
        'weight': 0.18103095518901027}
```

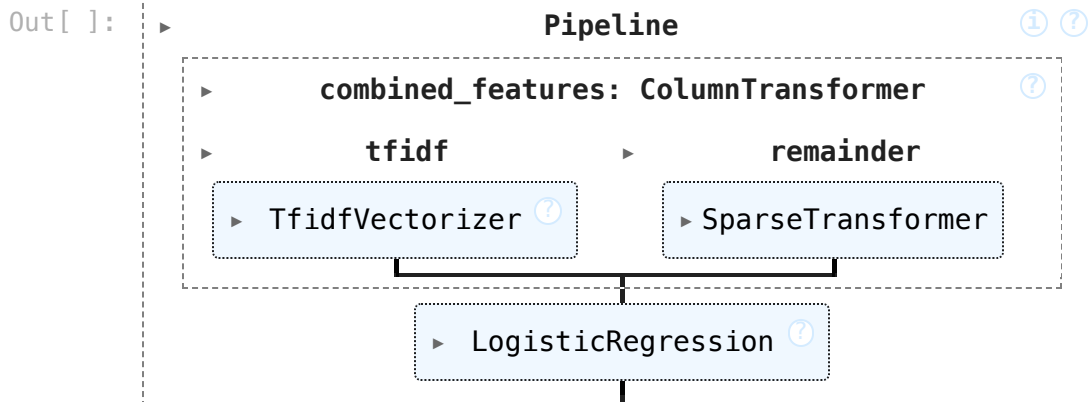
```
In [ ]: study.best_value
```

```
Out[ ]: 0.796681472311301
```

```
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']
```

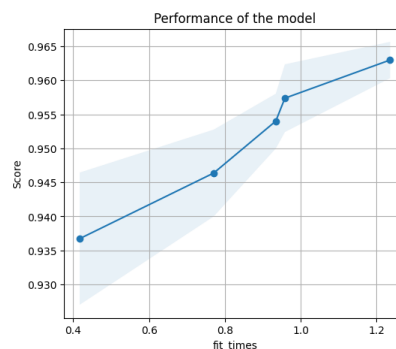
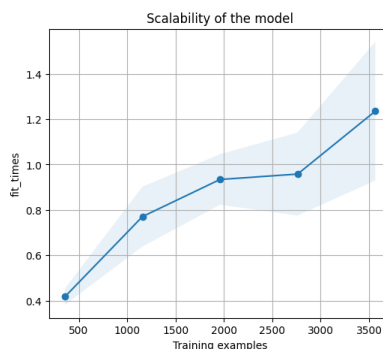
```
In [ ]: best_classifier_3 = Pipeline([('combined_features',  
                                     ColumnTransformer( transformers=[('tfidf',  
                                                                       TfidfVector  
                                                                       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	0.96	1.00	0.98	966
1	0.97	0.70	0.82	149
accuracy			0.96	1115
macro avg	0.96	0.85	0.90	1115
weighted avg	0.96	0.96	0.95	1115