

# CommentToxicity Project

February 19, 2025

```
[1]: !pip install tensorflow pandas matplotlib scikit-learn
```

```
Requirement already satisfied: tensorflow in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(2.18.0)
Requirement already satisfied: pandas in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(2.2.3)
Requirement already satisfied: matplotlib in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(3.9.2)
Requirement already satisfied: scikit-learn in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(1.5.1)
Requirement already satisfied: absl-py>=1.0.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from tensorflow) (2.1.0)
Requirement already satisfied: astunparse>=1.6.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers>=24.3.25 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from tensorflow) (25.2.10)
Requirement already satisfied: gast!=0.5.0,!0.5.1,!0.5.2,>=0.2.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from tensorflow) (0.6.0)
Requirement already satisfied: google-pasta>=0.1.1 in
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(from tensorflow) (0.2.0)
Requirement already satisfied: libclang>=13.0.0 in
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(from tensorflow) (18.1.1)
Requirement already satisfied: opt-einsum>=2.3.2 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from tensorflow) (3.4.0)
Requirement already satisfied: packaging in
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(from tensorflow) (24.1)
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Requirement already satisfied:  
 protobuf!=4.21.0,!4.21.1,!4.21.2,!4.21.3,!4.21.4,!4.21.5,<6.0.0dev,>=3.20.3  
 in /Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-  
 packages (from tensorflow) (5.29.3)

Requirement already satisfied: requests<3,>=2.21.0 in  
 /Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
 (from tensorflow) (2.32.3)

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Requirement already satisfied: six>=1.12.0 in  
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 (from tensorflow) (1.17.0)

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 (from tensorflow) (2.5.0)

Requirement already satisfied: typing-extensions>=3.6.6 in  
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 (from tensorflow) (4.12.2)

Requirement already satisfied: wrapt>=1.11.0 in  
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Requirement already satisfied: keras>=3.5.0 in  
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 (from tensorflow) (3.12.1)

Requirement already satisfied: ml-dtypes<0.5.0,>=0.4.0 in  
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 (from pandas) (2.9.0.post0)

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(from pandas) (2025.1)  
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Requirement already satisfied: contourpy>=1.0.1 in  
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(from matplotlib) (1.2.1)  
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(from matplotlib) (0.12.1)  
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(from matplotlib) (4.53.1)  
Requirement already satisfied: kiwisolver>=1.3.1 in  
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(from matplotlib) (1.4.5)  
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(from matplotlib) (10.4.0)  
Requirement already satisfied: pyparsing>=2.3.1 in  
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(from matplotlib) (3.1.2)  
Requirement already satisfied: scipy>=1.6.0 in  
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(from scikit-learn) (1.14.0)  
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(from scikit-learn) (1.4.2)  
Requirement already satisfied: threadpoolctl>=3.1.0 in  
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(from scikit-learn) (3.5.0)  
Requirement already satisfied: wheel<1.0,>=0.23.0 in  
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(from astunparse>=1.6.0->tensorflow) (0.45.1)  
Requirement already satisfied: rich in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from keras>=3.5.0->tensorflow) (13.9.4)  
Requirement already satisfied: namex in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from keras>=3.5.0->tensorflow) (0.0.8)  
Requirement already satisfied: optree in  
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(from keras>=3.5.0->tensorflow) (0.14.0)  
Requirement already satisfied: charset-normalizer<4,>=2 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from requests<3,>=2.21.0->tensorflow) (3.3.2)  
Requirement already satisfied: idna<4,>=2.5 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages

```
(from requests<3,>=2.21.0->tensorflow) (3.7)
Requirement already satisfied: urllib3<3,>=1.21.1 in
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(from requests<3,>=2.21.0->tensorflow) (2.2.2)
Requirement already satisfied: certifi>=2017.4.17 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from requests<3,>=2.21.0->tensorflow) (2024.7.4)
Requirement already satisfied: markdown>=2.6.8 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from tensorboard<2.19,>=2.18->tensorflow) (3.7)
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from tensorboard<2.19,>=2.18->tensorflow) (0.7.2)
Requirement already satisfied: werkzeug>=1.0.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from tensorboard<2.19,>=2.18->tensorflow) (3.0.4)
Requirement already satisfied: MarkupSafe>=2.1.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from werkzeug>=1.0.1->tensorboard<2.19,>=2.18->tensorflow) (2.1.5)
Requirement already satisfied: markdown-it-py>=2.2.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from rich->keras>=3.5.0->tensorflow) (3.0.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from rich->keras>=3.5.0->tensorflow) (2.18.0)
Requirement already satisfied: mdurl~=0.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from markdown-it-py>=2.2.0->rich->keras>=3.5.0->tensorflow) (0.1.2)
```

```
[2]: import os    # for navigating thorough different file paths
import pandas as pd
import tensorflow as tf
import numpy as np
```

```
[3]: df = pd.read_csv(os.path.
    ↪join('jigsaw-toxic-comment-classification-challenge', 'train.csv', 'train.
    ↪csv'))
```

```
[4]: df.head()
```

```
[4]:
```

	id	comment_text	toxic \
0	0000997932d777bf	Explanation\nWhy the edits made under my usern...	0
1	000103f0d9c9fb60f	D'aww! He matches this background colour I'm s...	0
2	000113f07ec002fd	Hey man, I'm really not trying to edit war. It...	0
3	0001b41b1c6bb37e	"\nMore\nI can't make any real suggestions on ...	0
4	0001d958c54c6e35	You, sir, are my hero. Any chance you remember...	0

```
severe_toxic  obscene  threat  insult  identity_hate
```

0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0

```
[5]: df.iloc[3]['comment_text']
```

```
[5]: '"\nMore\nI can\'t make any real suggestions on improvement - I wondered if the
section statistics should be later on, or a subsection of "types of accidents"
-I think the references may need tidying so that they are all in the exact same
format ie date format etc. I can do that later on, if no-one else does first -
if you have any preferences for formatting style on references or want to do it
yourself please let me know.\n\nThere appears to be a backlog on articles for
review so I guess there may be a delay until a reviewer turns up. It\'s listed
in the relevant form eg Wikipedia:Good_article_nominations#Transport  "'
```

```
[6]: df[df.columns[2:]].iloc[3]
```

```
[6]: toxic          0
severe_toxic       0
obscene            0
threat             0
insult             0
identity_hate      0
Name: 3, dtype: int64
```

## 1 Preprocess Comments

```
[7]: from tensorflow.keras.layers import TextVectorization      # text vectorization
      ↪ layer to be used for tokenisation
      # it's a preprocessing layer which maps text features to integer sequences
```

```
[8]: # split comments and features

X = df['comment_text'] # comments
y = df[df.columns[2:]].values # labels
```

```
[9]: MAX_FEATURES = 200000 # No. of words in the vocabulary
```

```
[10]: # initialise text vectorization layer
vectorizer = TextVectorization(max_tokens=MAX_FEATURES,
                               output_sequence_length=1800,
                               output_mode='int')
```

```
[11]: # teach vectorizer the vocabulary
vectorizer.adapt(X.values)
```

```
[12]: vectorizer.get_vocabulary()
```

```
[12]: ['',  
      '[UNK]',  
      np.str_('the'),  
      np.str_('to'),  
      np.str_('of'),  
      np.str_('and'),  
      np.str_('a'),  
      np.str_('you'),  
      np.str_('i'),  
      np.str_('is'),  
      np.str_('that'),  
      np.str_('in'),  
      np.str_('it'),  
      np.str_('for'),  
      np.str_('this'),  
      np.str_('not'),  
      np.str_('on'),  
      np.str_('be'),  
      np.str_('as'),  
      np.str_('have'),  
      np.str_('are'),  
      np.str_('your'),  
      np.str_('with'),  
      np.str_('if'),  
      np.str_('article'),  
      np.str_('was'),  
      np.str_('or'),  
      np.str_('but'),  
      np.str_('page'),  
      np.str_('my'),  
      np.str_('an'),  
      np.str_('from'),  
      np.str_('by'),  
      np.str_('do'),  
      np.str_('at'),  
      np.str_('about'),  
      np.str_('me'),  
      np.str_('so'),  
      np.str_('wikipedia'),  
      np.str_('can'),  
      np.str_('what'),  
      np.str_('there'),  
      np.str_('all'),  
      np.str_('has'),  
      np.str_('will'),
```

np.str\_('talk'),  
np.str\_('please'),  
np.str\_('would'),  
np.str\_('its'),  
np.str\_('no'),  
np.str\_('one'),  
np.str\_('just'),  
np.str\_('like'),  
np.str\_('they'),  
np.str\_('he'),  
np.str\_('dont'),  
np.str\_('which'),  
np.str\_('any'),  
np.str\_('been'),  
np.str\_('should'),  
np.str\_('more'),  
np.str\_('we'),  
np.str\_('some'),  
np.str\_('other'),  
np.str\_('who'),  
np.str\_('see'),  
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np.str\_('same'),  
np.str\_('ive'),  
np.str\_('deleted'),  
np.str\_('into'),



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np.str\_('over'),  
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np.str\_('him'),  
np.str\_('two'),  
np.str\_('back'),  
np.str\_('too'),  
np.str\_('fact'),  
np.str\_('link'),  
np.str\_('said'),  
np.str\_('own'),  
np.str\_('something'),  
np.str\_('going'),  
np.str\_('youre'),  
np.str\_('blocked'),  
np.str\_('list'),  
np.str\_('stop'),  
np.str\_('without'),  
np.str\_('content'),  
np.str\_('hi'),  
np.str\_('under'),  
np.str\_('editors'),  
np.str\_('our'),  
np.str\_('block'),  
np.str\_('thats'),  
np.str\_('us'),  
np.str\_('added'),  
np.str\_('utc'),  
np.str\_('history'),  
np.str\_('another'),  
np.str\_('doesnt'),  
np.str\_('removed'),  
np.str\_('might'),  
np.str\_('note'),

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np.str\_('sure'),  
np.str\_('place'),  
np.str\_('never'),  
np.str\_('done'),  
np.str\_('welcome'),  
np.str\_('her'),  
np.str\_('case'),  
np.str\_('put'),  
np.str\_('personal'),  
np.str\_('seems'),  
np.str\_('reason'),  
np.str\_('better'),  
np.str\_('using'),  
np.str\_('yourself'),  
np.str\_('cant'),  
np.str\_('actually'),  
np.str\_('ask'),  
np.str\_('comment'),  
np.str\_('while'),  
np.str\_('vandalism'),  
np.str\_('feel'),  
np.str\_('question'),  
np.str\_('anything'),  
np.str\_('believe'),  
np.str\_('person'),  
np.str\_('links'),  
np.str\_('things'),  
np.str\_('both'),  
np.str\_('didnt'),  
np.str\_('comments'),  
np.str\_('best'),  
np.str\_('ill'),  
np.str\_('part'),  
np.str\_('she'),  
np.str\_('hope'),  
np.str\_('policy'),  
np.str\_('against'),  
np.str\_('off'),  
np.str\_('keep'),  
np.str\_('already'),  
np.str\_('free'),  
np.str\_('wiki'),  
np.str\_('thing'),  
np.str\_('nothing'),  
np.str\_('change'),  
np.str\_('wrong'),

np.str\_('though'),  
np.str\_('problem'),  
np.str\_('remove'),  
np.str\_('little'),  
np.str\_('subject'),  
np.str\_('•'),  
np.str\_('others'),  
np.str\_('trying'),  
np.str\_('tag'),  
np.str\_('copyright'),  
np.str\_('must'),  
np.str\_('understand'),  
np.str\_('above'),  
np.str\_('few'),  
np.str\_('anyone'),  
np.str\_('speedy'),  
np.str\_('last'),  
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np.str\_('give'),  
np.str\_('questions'),  
np.str\_('agree'),  
np.str\_('rather'),  
np.str\_('years'),  
np.str\_('let'),  
np.str\_('2'),  
np.str\_('different'),  
np.str\_('editor'),  
np.str\_('long'),  
np.str\_('reliable'),  
np.str\_('making'),  
np.str\_('world'),  
np.str\_('come'),  
np.str\_('sorry'),  
np.str\_('isnt'),  
np.str\_('reference'),  
np.str\_('mean'),  
np.str\_('continue'),  
np.str\_('try'),  
np.str\_('references'),  
np.str\_('found'),  
np.str\_('doing'),  
np.str\_('text'),  
np.str\_('great'),  
np.str\_('leave'),  
np.str\_('says'),  
np.str\_('got'),  
np.str\_('probably'),

```
np.str_('english'),
np.str_('original'),
np.str_('every'),
np.str_('1'),
np.str_('simply'),
np.str_('word'),
np.str_('users'),
np.str_('fair'),
np.str_('hello'),
np.str_('either'),
np.str_('check'),
np.str_('least'),
np.str_('adding'),
np.str_('ip'),
np.str_('show'),
np.str_('site'),
np.str_('state'),
np.str_('else'),
np.str_('delete'),
np.str_('consensus'),
np.str_('enough'),
np.str_('request'),
np.str_('far'),
np.str_('opinion'),
np.str_('created'),
np.str_('around'),
np.str_('life'),
np.str_('day'),
np.str_('between'),
np.str_('through'),
np.str_('example'),
np.str_('view'),
np.str_('yes'),
np.str_('reverted'),
np.str_('yet'),
np.str_('etc'),
np.str_('id'),
np.str_('matter'),
np.str_('shit'),
np.str_('u'),
np.str_('war'),
np.str_('notable'),
np.str_('contributions'),
np.str_('given'),
np.str_('thought'),
np.str_('material'),
np.str_('book'),
```

np.str\_('admin'),  
np.str\_('write'),  
np.str\_('post'),  
np.str\_('down'),  
np.str\_('account'),  
np.str\_('clearly'),  
np.str\_('having'),  
np.str\_('encyclopedia'),  
np.str\_('lot'),  
np.str\_('support'),  
np.str\_('real'),  
np.str\_('bad'),  
np.str\_('message'),  
np.str\_('needs'),  
np.str\_('images'),  
np.str\_('tell'),  
np.str\_('seem'),  
np.str\_('called'),  
np.str\_('maybe'),  
np.str\_('evidence'),  
np.str\_('instead'),  
np.str\_('ever'),  
np.str\_('3'),  
np.str\_('correct'),  
np.str\_('saying'),  
np.str\_('clear'),  
np.str\_('always'),  
np.str\_('number'),  
np.str\_('important'),  
np.str\_('further'),  
np.str\_('quite'),  
np.str\_('perhaps'),  
np.str\_('old'),  
np.str\_(' - '),  
np.str\_('true'),  
np.str\_('until'),  
np.str\_('hate'),  
np.str\_('states'),  
np.str\_('whether'),  
np.str\_('consider'),  
np.str\_('written'),  
np.str\_('claim'),  
np.str\_('language'),  
np.str\_('media'),  
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...]
```

```
[13]: vectorized_text = vectorizer(X.values)
      vectorized_text
```

```
[13]: <tf.Tensor: shape=(159571, 1800), dtype=int64, numpy=
array([[ 645,    76,     2, ...,    0,     0,     0],
       [   1,    54,  2489, ...,    0,     0,     0],
       [ 425,   441,    70, ...,    0,     0,     0],
       ...,
       [32445,  7392,   383, ...,    0,     0,     0],
       [   5,    12,   534, ...,    0,     0,     0],
       [   5,     8,   130, ...,    0,     0,     0]])>
```

```
[14]: # creating tensorflow data pipeline

#MCSBP - map, cache, shuffle, batch, prefetch from_tensor_slices, list_files
↳--> operations in tensorflow data pipeline
dataset = tf.data.Dataset.from_tensor_slices((vectorized_text, y))
dataset = dataset.cache()
dataset = dataset.shuffle(160000)
dataset = dataset.batch(16)
dataset = dataset.prefetch(8) # helps bottlenecks
```

```
[15]: batch_X, batch_y = dataset.as_numpy_iterator().next()
```

```
[16]: len(dataset) # no. of batches
```

```
[16]: 9974
```

```
[17]: train = dataset.take(int(len(dataset)*.7)) # train 70% of data
```

```
val = dataset.skip(int(len(dataset)*.7)).take(int(len(dataset)*.2)) #  
    ↪ validation of 20% of data  
test = dataset.skip(int(len(dataset)*.9)).take(int(len(dataset)*.1)) # 10% of  
    ↪ data for testing
```

## 2 Create Sequential Model

```
[18]: from tensorflow.keras.models import Sequential  
      from tensorflow.keras.layers import LSTM, Dropout, Bidirectional, Dense,  
      ↪ Embedding
```

```
[19]: # creating neural network  
  
model = Sequential()    #instantiate sequential API  
  
# create embedding layer  
model.add(Embedding(MAX_FEATURES+1, 32))  
  
# create bidirectional LSTM layer  
model.add(Bidirectional(LSTM(32, activation='tanh'))) # used 'tanh' activation  
    ↪ function because the gpu acceleration that is required for an LSTM layer  
    ↪ needs to be 10h  
  
# Feature extractor, Fully connected layers  
model.add(Dense(128, activation='relu'))  
model.add(Dense(256, activation='relu'))  
model.add(Dense(128, activation='relu'))  
  
# Final layer  
model.add(Dense(6, activation='sigmoid'))
```

```
[20]: model.compile(optimizer='adam', loss='binary_crossentropy',  
    ↪ metrics=['accuracy'])
```

```
[21]: model.build(input_shape=(None, None))
```

```
[22]: model.summary()
```

Model: "sequential"

Layer (type)	Output Shape	Param #
embedding (Embedding)	(None, None, 32)	6,400,032
bidirectional (Bidirectional)	(None, 64)	16,640

dense (Dense)	(None, 128)	8,320
dense_1 (Dense)	(None, 256)	33,024
dense_2 (Dense)	(None, 128)	32,896
dense_3 (Dense)	(None, 6)	774

Total params: 6,491,686 (24.76 MB)

Trainable params: 6,491,686 (24.76 MB)

Non-trainable params: 0 (0.00 B)

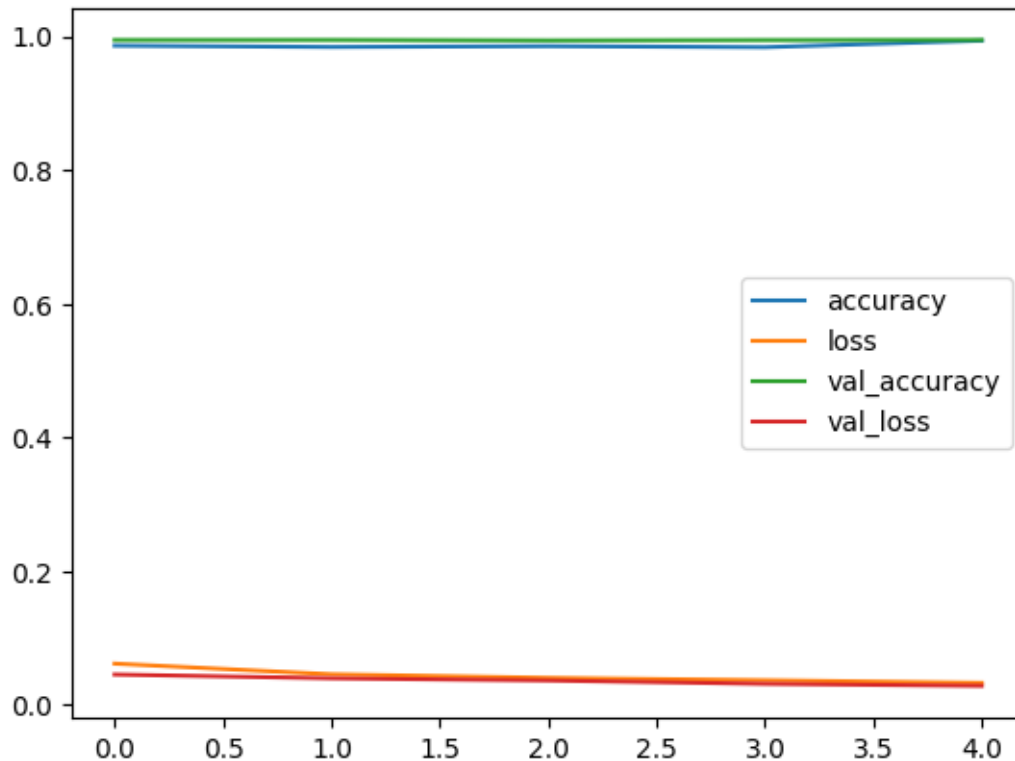
```
[23]: # train the neural network
history = model.fit(train, epochs=5, validation_data=val)
```

```
Epoch 1/5
6981/6981          2605s
373ms/step - accuracy: 0.9638 - loss: 0.0829 - val_accuracy: 0.9946 - val_loss:
0.0454
Epoch 2/5
6981/6981          2750s
394ms/step - accuracy: 0.9800 - loss: 0.0454 - val_accuracy: 0.9946 - val_loss:
0.0397
Epoch 3/5
6981/6981          2540s
364ms/step - accuracy: 0.9696 - loss: 0.0404 - val_accuracy: 0.9940 - val_loss:
0.0364
Epoch 4/5
6981/6981          2669s
382ms/step - accuracy: 0.9819 - loss: 0.0372 - val_accuracy: 0.9945 - val_loss:
0.0314
Epoch 5/5
6981/6981          2643s
379ms/step - accuracy: 0.9935 - loss: 0.0325 - val_accuracy: 0.9947 - val_loss:
0.0284
```

```
[24]: from matplotlib import pyplot as plt
```

```
[25]: plt.figure(figsize=(8,5))
pd.DataFrame(history.history).plot()
plt.show()
```

<Figure size 800x500 with 0 Axes>



### 3 Make Predictions

```
[26]: input_text = vectorizer("You are an idiot!!..get lost or I'll hit you")
```

```
[27]: input_text
```

```
[27]: <tf.Tensor: shape=(1800,), dtype=int64, numpy=array([ 7, 20, 30, ...,  0,  0,  0])>
```

```
[28]: model.predict(np.expand_dims(input_text, 0))
```

```
1/1          0s 304ms/step
```

```
[28]: array([[8.4142941e-01, 9.5946854e-04, 1.5159310e-01, 7.9496246e-04, 2.6209059e-01, 5.5799438e-03]], dtype=float32)
```

```
[29]: df.columns[2:]
```

```
[29]: Index(['toxic', 'severe_toxic', 'obscene', 'threat', 'insult', 'identity_hate'],
```

```
dtype='object')
```

```
[30]: res = model.predict(np.expand_dims(input_text, 0))
```

```
1/1          0s 43ms/step
```

```
[31]: (res > 0.5).astype(int)
```

```
[31]: array([[1, 0, 0, 0, 0, 0]])
```

```
[32]: batch = test.as_numpy_iterator().next()
```

```
[33]: batch_X, batch_y = test.as_numpy_iterator().next()
```

```
[34]: (model.predict(batch_X) > 0.5).astype(int)
```

```
1/1          0s 209ms/step
```

```
[34]: array([[0, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0],
            [1, 0, 1, 0, 1, 0],
            [1, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0],
            [1, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0],
            [1, 0, 1, 0, 1, 0],
            [1, 0, 0, 0, 1, 0],
            [0, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0],
            [0, 0, 0, 0, 0, 0]])
```

```
[35]: res.shape
```

```
[35]: (1, 6)
```

## 4 Evaluate the Model

```
[36]: from tensorflow.keras.metrics import Precision, Recall, CategoricalAccuracy
```

```
[37]: pre = Precision()
      re = Recall()
      acc = CategoricalAccuracy()
```

```
[38]: for batch in test.as_numpy_iterator():
      # Unpack the batch
      X_true, y_true = batch
      # Make a prediction
      yhat = model.predict(X_true)

      # Flatten the predictions
      y_true = y_true.flatten()
      yhat = yhat.flatten()

      pre.update_state(y_true, yhat)
      re.update_state(y_true, yhat)
      acc.update_state(y_true, yhat)
```

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```
2025-02-19 00:46:53.772993: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
```

```
[39]: print(f'Precision: {pre.result().numpy()}, Recall:{re.result().numpy()},
      ↪Accuracy:{acc.result().numpy()}')
```

```
Precision: 0.8485862016677856, Recall:0.8156049251556396,
Accuracy:0.4934804439544678
```

```
[40]: !pip install gradio jinja2
```

```
Collecting gradio
  Downloading gradio-5.16.1-py3-none-any.whl.metadata (16 kB)
Requirement already satisfied: jinja2 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(3.1.4)
Collecting aiofiles<24.0,>=22.0 (from gradio)
  Downloading aiofiles-23.2.1-py3-none-any.whl.metadata (9.7 kB)
Requirement already satisfied: anyio<5.0,>=3.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (4.4.0)
Collecting fastapi<1.0,>=0.115.2 (from gradio)
  Downloading fastapi-0.115.8-py3-none-any.whl.metadata (27 kB)
Collecting ffmpy (from gradio)
  Downloading ffmpy-0.5.0-py3-none-any.whl.metadata (3.0 kB)
Collecting gradio-client==1.7.0 (from gradio)
  Downloading gradio_client-1.7.0-py3-none-any.whl.metadata (7.1 kB)
Requirement already satisfied: httpx>=0.24.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (0.27.0)
Requirement already satisfied: huggingface-hub>=0.28.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (0.28.1)
Requirement already satisfied: markupsafe~=2.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (2.1.5)
Requirement already satisfied: numpy<3.0,>=1.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (2.0.2)
Collecting orjson~=3.0 (from gradio)
  Downloading orjson-3.10.15-cp311-cp311-
macosx_10_15_x86_64.macosx_11_0_arm64.macosx_10_15_universal2.whl.metadata (41
kB)
Requirement already satisfied: packaging in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
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(from gradio) (24.1)
Requirement already satisfied: pandas<3.0,>=1.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (2.2.3)
Requirement already satisfied: pillow<12.0,>=8.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (10.4.0)
Collecting pydantic>=2.0 (from gradio)
  Downloading pydantic-2.10.6-py3-none-any.whl.metadata (30 kB)
Collecting pydub (from gradio)
  Downloading pydub-0.25.1-py2.py3-none-any.whl.metadata (1.4 kB)
Collecting python-multipart>=0.0.18 (from gradio)
  Downloading python_multipart-0.0.20-py3-none-any.whl.metadata (1.8 kB)
Requirement already satisfied: pyyaml<7.0,>=5.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (6.0.1)
Collecting ruff>=0.9.3 (from gradio)
  Downloading ruff-0.9.6-py3-none-macosx_11_0_arm64.whl.metadata (25 kB)
Collecting safehttpx<0.2.0,>=0.1.6 (from gradio)
  Downloading safehttpx-0.1.6-py3-none-any.whl.metadata (4.2 kB)
Collecting semantic-version~=2.0 (from gradio)
  Downloading semantic_version-2.10.0-py2.py3-none-any.whl.metadata (9.7 kB)
Collecting starlette<1.0,>=0.40.0 (from gradio)
  Downloading starlette-0.45.3-py3-none-any.whl.metadata (6.3 kB)
Collecting tomlkit<0.14.0,>=0.12.0 (from gradio)
  Downloading tomlkit-0.13.2-py3-none-any.whl.metadata (2.7 kB)
Collecting typer<1.0,>=0.12 (from gradio)
  Downloading typer-0.15.1-py3-none-any.whl.metadata (15 kB)
Requirement already satisfied: typing-extensions~=4.0 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio) (4.12.2)
Collecting uvicorn>=0.14.0 (from gradio)
  Downloading uvicorn-0.34.0-py3-none-any.whl.metadata (6.5 kB)
Requirement already satisfied: fsspec in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from gradio-client==1.7.0->gradio) (2025.2.0)
Collecting websockets<15.0,>=10.0 (from gradio-client==1.7.0->gradio)
  Downloading websockets-14.2-cp311-cp311-macosx_11_0_arm64.whl.metadata (6.8
kB)
Requirement already satisfied: idna>=2.8 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from anyio<5.0,>=3.0->gradio) (3.7)
Requirement already satisfied: sniffio>=1.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from anyio<5.0,>=3.0->gradio) (1.3.1)
Requirement already satisfied: certifi in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from httpx>=0.24.1->gradio) (2024.7.4)

```

Requirement already satisfied: httpcore==1.\* in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from httpx>=0.24.1->gradio) (1.0.5)

Requirement already satisfied: h11<0.15,>=0.13 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from httpcore==1.\*->httpx>=0.24.1->gradio) (0.14.0)

Requirement already satisfied: filelock in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from huggingface-hub>=0.28.1->gradio) (3.17.0)

Requirement already satisfied: requests in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from huggingface-hub>=0.28.1->gradio) (2.32.3)

Requirement already satisfied: tqdm>=4.42.1 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from huggingface-hub>=0.28.1->gradio) (4.67.1)

Requirement already satisfied: python-dateutil>=2.8.2 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from pandas<3.0,>=1.0->gradio) (2.9.0.post0)

Requirement already satisfied: pytz>=2020.1 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from pandas<3.0,>=1.0->gradio) (2025.1)

Requirement already satisfied: tzdata>=2022.7 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from pandas<3.0,>=1.0->gradio) (2025.1)

Collecting annotated-types>=0.6.0 (from pydantic>=2.0->gradio)  
 Downloading annotated\_types-0.7.0-py3-none-any.whl.metadata (15 kB)

Collecting pydantic-core==2.27.2 (from pydantic>=2.0->gradio)  
 Downloading pydantic\_core-2.27.2-cp311-cp311-macosx\_11\_0\_arm64.whl.metadata  
(6.6 kB)

Requirement already satisfied: click>=8.0.0 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from typer<1.0,>=0.12->gradio) (8.1.7)

Collecting shellingham>=1.3.0 (from typer<1.0,>=0.12->gradio)  
 Downloading shellingham-1.5.4-py2.py3-none-any.whl.metadata (3.5 kB)

Requirement already satisfied: rich>=10.11.0 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from typer<1.0,>=0.12->gradio) (13.9.4)

Requirement already satisfied: six>=1.5 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from python-dateutil>=2.8.2->pandas<3.0,>=1.0->gradio) (1.17.0)

Requirement already satisfied: markdown-it-py>=2.2.0 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from rich>=10.11.0->typer<1.0,>=0.12->gradio) (3.0.0)

Requirement already satisfied: pygments<3.0.0,>=2.13.0 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages  
(from rich>=10.11.0->typer<1.0,>=0.12->gradio) (2.18.0)

Requirement already satisfied: charset-normalizer<4,>=2 in  
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages

```

(from requests->huggingface-hub>=0.28.1->gradio) (3.3.2)
Requirement already satisfied: urllib3<3,>=1.21.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from requests->huggingface-hub>=0.28.1->gradio) (2.2.2)
Requirement already satisfied: mdurl~=0.1 in
/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages
(from markdown-it-py>=2.2.0->rich>=10.11.0->typer<1.0,>=0.12->gradio) (0.1.2)
Downloading gradio-5.16.1-py3-none-any.whl (62.2 MB)
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Downloading uvicorn-0.34.0-py3-none-any.whl (62 kB)
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Downloading shellingham-1.5.4-py2.py3-none-any.whl (9.8 kB)
Downloading websockets-14.2-cp311-cp311-macosx_11_0_arm64.whl (160 kB)
Installing collected packages: pydub, websockets, uvicorn, tomlkit, shellingham,
semantic-version, ruff, python-multipart, pydantic-core, orjson, ffmpeg,
annotated-types, aiofiles, starlette, pydantic, typer, safehttpx, gradio-client,
fastapi, gradio
Successfully installed aiofiles-23.2.1 annotated-types-0.7.0 fastapi-0.115.8
ffmpeg-0.5.0 gradio-5.16.1 gradio-client-1.7.0 orjson-3.10.15 pydantic-2.10.6
pydantic-core-2.27.2 pydub-0.25.1 python-multipart-0.0.20 ruff-0.9.6
safehttpx-0.1.6 semantic-version-2.10.0 shellingham-1.5.4 starlette-0.45.3
tomlkit-0.13.2 typer-0.15.1 uvicorn-0.34.0 websockets-14.2

```

```

[41]: import tensorflow as tf
import gradio as gr

```

```

/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-

```



```
packages/tqdm/auto.py:21: TqdmWarning: IPProgress not found. Please update
jupyter and ipywidgets. See
https://ipywidgets.readthedocs.io/en/stable/user_install.html
from .autonotebook import tqdm as notebook_tqdm
```

```
[42]: model.save('toxicity.h5')
```

```
WARNING:absl:You are saving your model as an HDF5 file via `model.save()` or
`keras.saving.save_model(model)`. This file format is considered legacy. We
recommend using instead the native Keras format, e.g.
`model.save('my_model.keras')` or `keras.saving.save_model(model,
'my_model.keras')`.
```

```
[43]: model = tf.keras.models.load_model('toxicity.h5')
```

```
WARNING:absl:Compiled the loaded model, but the compiled metrics have yet to be
built. `model.compile_metrics` will be empty until you train or evaluate the
model.
```

```
[47]: input_str = vectorizer('I really hate you!')
```

```
[48]: res = model.predict(np.expand_dims(input_str,0))
```

```
1/1          0s 44ms/step
```

```
[49]: res
```

```
[49]: array([[4.2084917e-01, 9.3809664e-05, 2.3514960e-02, 3.5636926e-03,
          7.7526249e-02, 9.8059932e-03]], dtype=float32)
```

```
[50]: def score_comment(comment):
      vectorized_comment = vectorizer([comment])
      results = model.predict(vectorized_comment)

      text = ''
      for idx, col in enumerate(df.columns[2:]):
          text += '{}: {}\n'.format(col, results[0][idx]>0.5)

      return text
```

```
[52]: interface = gr.Interface(
      fn=score_comment,
      inputs=gr.Textbox(lines=2, placeholder="Comment to score"),
      outputs=gr.Text()
  )
```

```
[53]: interface.launch(share=True)
```

```
* Running on local URL:  http://127.0.0.1:7860
* Running on public URL: https://1714483688f1c03dc6.gradio.live
```

This share link expires in 72 hours. For free permanent hosting and GPU upgrades, run `gradio deploy` from the terminal in the working directory to deploy to Hugging Face Spaces (<https://huggingface.co/spaces>)

<IPython.core.display.HTML object>

[53]:

1/1                      0s 39ms/step

[ ]:

