Copyright Notice

audio

"nsynth"

image

"abstract_reasoning"
"caltech101"
"cats_vs_dogs"
"celeb_a"
"celeb_a_hq"
"cifar10"
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"diabetic_retinopathy..."
"dsprites"
"dtd"
"emnist"
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"image_label_folder"
"imagenet2012"
"imagenet2012_corrupted"
"kmnist"
"lsun"
"mnist"
"omniglot"
"open_images_v4"
"oxford_iiit_pet"
"quickdraw_bitmap"
"rock_paper_scissors"
"shapes3d"
"smallnorb"
"sun397"
"svhn_cropped"
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structured

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"iris"
"titanic"

text

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"glue"
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"squad"
"wikipedia"
"xnli"

translate

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"para_crawl"
"ted_hrlr_translate"
"ted_multi_translate"
"wmt15_translate"
"wmt16_translate"
"wmt17_translate"
"wmt18_translate"
"wmt19_translate"

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"wmt19_translate"

http://ai.stanford.edu/~amaas/data/sentiment/

```
@InProceedings{maas-EtAl:2011:ACL-HLT2011,
  author    = {Maas, Andrew L.  and  Daly, Raymond E.  and  Pham, Peter T.  and  Huang, Dan  and
Ng, Andrew Y.  and  Potts, Christopher},
  title     = {Learning Word Vectors for Sentiment Analysis},
  booktitle = {Proceedings of the 49th Annual Meeting of the Association for Computational
Linguistics: Human Language Technologies},
  month     = {June},
  year      = {2011},
  address   = {Portland, Oregon, USA},
  publisher = {Association for Computational Linguistics},
  pages     = {142--150},
  url       = {http://www.aclweb.org/anthology/P11-1015}
}
```

```
import tensorflow as tf
print(tf.__version__)
```

```
import tensorflow_datasets as tfds
imdb, info = tfds.load("imdb_reviews", with_info=True, as_supervised=True)
```

```
import numpy as np


train_data, test_data = imdb['train'], imdb['test']
```

```
training_sentences = []
training_labels = []

testing_sentences = []
testing_labels = []

for s,l in train_data:
  training_sentences.append(str(s.numpy()))
  training_labels.append(l.numpy())

for s,l in test_data:
  testing_sentences.append(str(s.numpy()))
  testing_labels.append(l.numpy())
```

```
training_sentences = []
training_labels = []

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testing_labels = []

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  testing_labels.append(l.numpy())
```

```
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  testing_labels.append(l.numpy())
```

```
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testing_sentences = []
testing_labels = []

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  training_labels.append(l.numpy())

for s,l in test_data:
  testing_sentences.append(str(s.numpy()))
  testing_labels.append(l.numpy())
```

```
tf.Tensor(b"As a lifelong fan of Dickens, I have invariably been disappointed
by adaptations of his novels.<br /><br />Although his works presented an
extremely accurate re-telling of human life at every level in Victorian Britain,
throughout them all was a pervasive thread of humour that could be both playful
or sarcastic as the narrative dictated. In a way, he was a literary
caricaturist and cartoonist. He could be serious and hilarious in the same
sentence. He pricked pride, lampooned arrogance, celebrated modesty,
and empathised with loneliness and poverty. It may be a clich\xc3\xa9, but
he was a people's writer.<br /><br />And it is the comedy that is so often
missing from his interpretations. At the time of writing, Oliver Twist
is being dramatised in serial form on BBC television. All of the misery
and cruelty is their, but non of the humour, irony, and savage lampoonery.",
shape=(), dtype=string)
```

```
tf.Tensor(1, shape=(), dtype=int64)
tf.Tensor(1, shape=(), dtype=int64)
tf.Tensor(1, shape=(), dtype=int64)
tf.Tensor(0, shape=(), dtype=int64)
tf.Tensor(0, shape=(), dtype=int64)
tf.Tensor(1, shape=(), dtype=int64)
```

```
training_labels_final = np.array(training_labels)
testing_labels_final = np.array(testing_labels)
```

```
vocab_size = 10000
embedding_dim = 16
max_length = 120
trunc_type='post'
oov_tok = "<OOV>"

from tensorflow.keras.preprocessing.text import Tokenizer
from tensorflow.keras.preprocessing.sequence import pad_sequences

tokenizer = Tokenizer(num_words = vocab_size, oov_token=oov_tok)
tokenizer.fit_on_texts(training_sentences)
word_index = tokenizer.word_index
sequences = tokenizer.texts_to_sequences(training_sentences)
padded = pad_sequences(sequences,maxlen=max_length, truncating=trunc_type)

testing_sequences = tokenizer.texts_to_sequences(testing_sentences)
testing_padded = pad_sequences(testing_sequences,maxlen=max_length)
```

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padded = pad_sequences(sequences,maxlen=max_length, truncating=trunc_type)

testing_sequences = tokenizer.texts_to_sequences(testing_sentences)
testing_padded = pad_sequences(testing_sequences,maxlen=max_length)
```

```
model = tf.keras.Sequential([
    tf.keras.layers.Embedding(vocab_size, embedding_dim, input_length=max_length),
    tf.keras.layers.Flatten(),
    tf.keras.layers.Dense(6, activation='relu'),
    tf.keras.layers.Dense(1, activation='sigmoid')
])
```

```
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    tf.keras.layers.Dense(1, activation='sigmoid')
])
```

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
embedding_9 (Embedding)      (None, 120, 16)           160000
_________________________________________________________________
flatten_3 (Flatten)          (None, 1920)              0
_________________________________________________________________
dense_14 (Dense)             (None, 6)                 11526
_________________________________________________________________
dense_15 (Dense)             (None, 1)                 7
=================================================================
Total params: 171,533
Trainable params: 171,533
Non-trainable params: 0
```

```
model = tf.keras.Sequential([
    tf.keras.layers.Embedding(vocab_size, embedding_dim, input_length=max_length),
    tf.keras.layers.GlobalAveragePooling1D(),
    tf.keras.layers.Dense(6, activation='relu'),
    tf.keras.layers.Dense(1, activation='sigmoid')
])
```

```
Layer (type)                 Output Shape              Param #
=================================================================
embedding_11 (Embedding)     (None, 120, 16)           160000
_________________________________________________________________
global_average_pooling1d_3 ( (None, 16)                0
_________________________________________________________________
dense_16 (Dense)             (None, 6)                 102
_________________________________________________________________
dense_17 (Dense)             (None, 1)                 7
=================================================================
Total params: 160,109
Trainable params: 160,109
Non-trainable params: 0
```

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

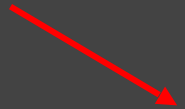
```
num_epochs = 10
model.fit(padded,
          training_labels_final,
          epochs=num_epochs,
          validation_data=(testing_padded, testing_labels_final))
```

```
Epoch 8/10
25000/25000 [==============================] -
6s 256us/sample - loss: 5.2086e-04 - acc: 1.0000 - val_loss: 0.7252 - val_acc: 0.8270
Epoch 9/10
25000/25000 [==============================] -
6s 222us/sample - loss: 3.0199e-04 - acc: 1.0000 - val_loss: 0.7628 - val_acc: 0.8269
Epoch 10/10
25000/25000 [==============================] -
6s 224us/sample - loss: 1.7872e-04 - acc: 1.0000 - val_loss: 0.7997 - val_acc: 0.8259
```

```
e = model.layers[0]
weights = e.get_weights()[0]
print(weights.shape) # shape: (vocab_size, embedding_dim)
```

```
(10000, 16)
```

Hello : 1
World : 2
How : 3
Are : 4
You : 5



reverse_word_index = tokenizer.index_word

1 : Hello
2 : World
3 : How
4 : Are
5 : You

```
import io

out_v = io.open('vecs.tsv', 'w', encoding='utf-8')
out_m = io.open('meta.tsv', 'w', encoding='utf-8')
for word_num in range(1, vocab_size):
  word = reverse_word_index[word_num]
  embeddings = weights[word_num]
  out_m.write(word + "\n")
  out_v.write('\t'.join([str(x) for x in embeddings]) + "\n")
out_v.close()
out_m.close()
```

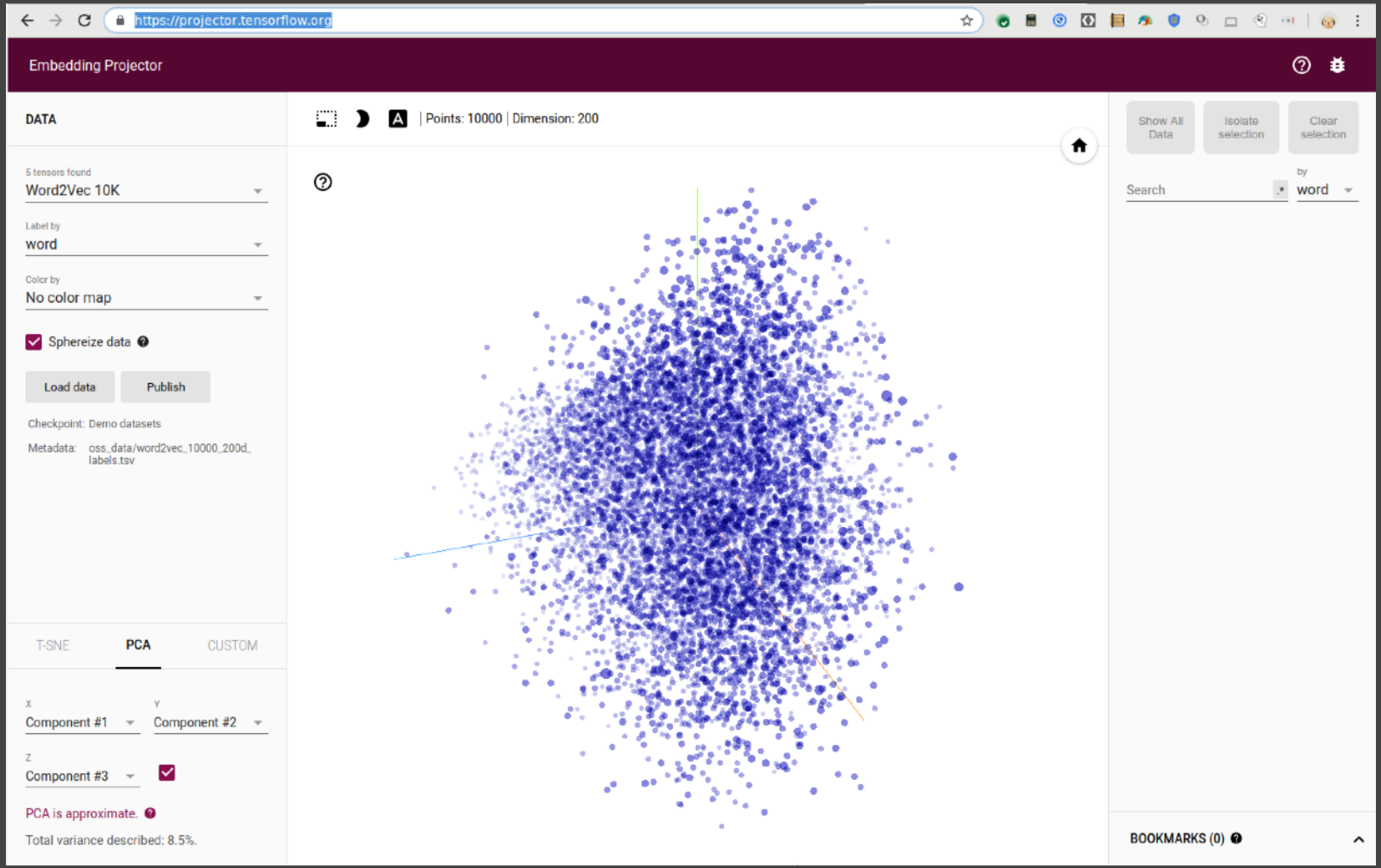
```
import io

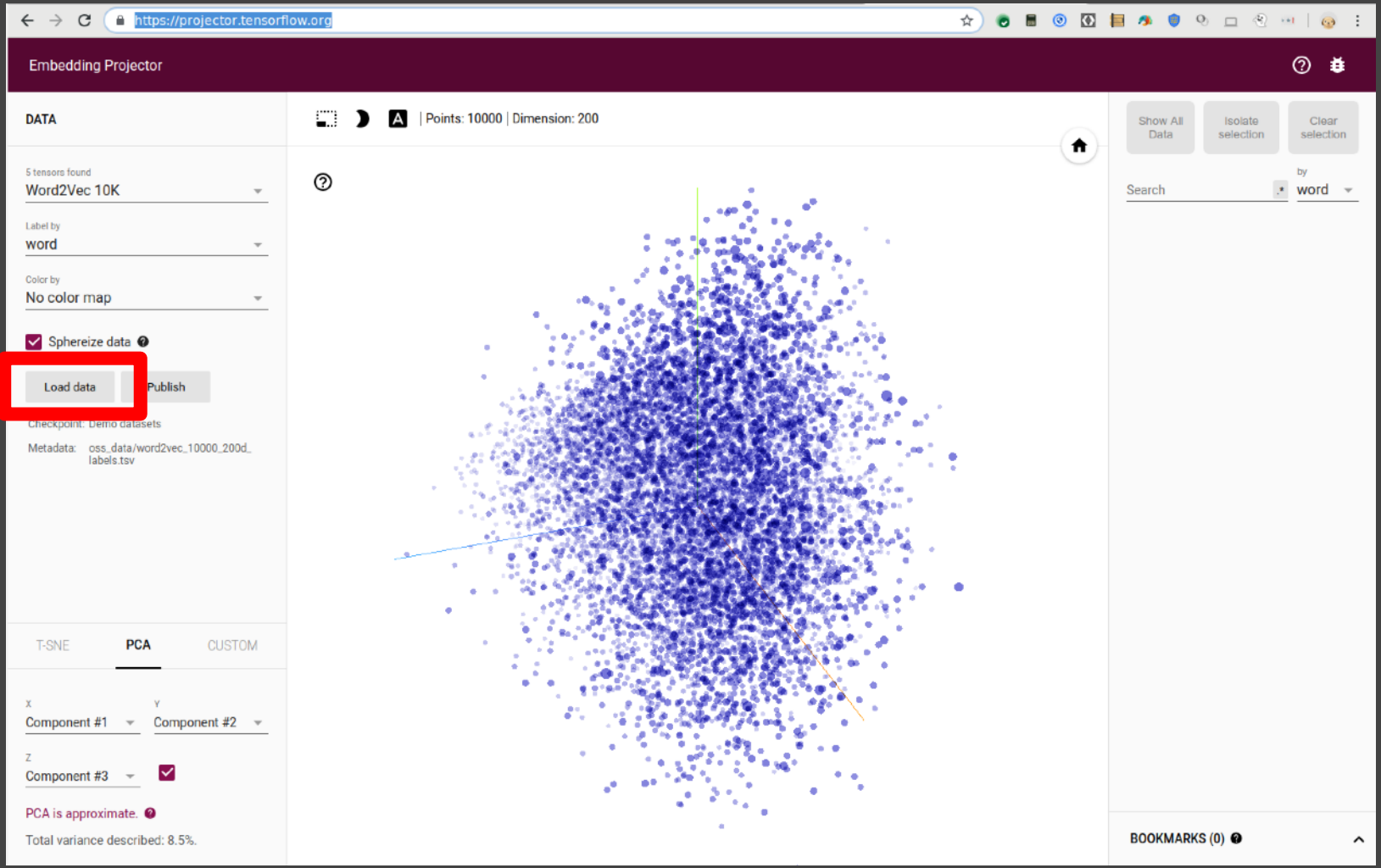
out_v = io.open('vecs.tsv', 'w', encoding='utf-8')
out_m = io.open('meta.tsv', 'w', encoding='utf-8')
for word_num in range(1, vocab_size):
  word = reverse_word_index[word_num]
  embeddings = weights[word_num]
  out_m.write(word + "\n")
  out_v.write('\t'.join([str(x) for x in embeddings]) + "\n")
out_v.close()
out_m.close()
```

```
import io

out_v = io.open('vecs.tsv', 'w', encoding='utf-8')
out_m = io.open('meta.tsv', 'w', encoding='utf-8')
for word_num in range(1, vocab_size):
  word = reverse_word_index[word_num]
  embeddings = weights[word_num]
  out_m.write(word + "\n")
  out_v.write('\t'.join([str(x) for x in embeddings]) + "\n")
out_v.close()
out_m.close()
```

```
try:
  from google.colab import files
except ImportError:
  pass
else:
  files.download('vecs.tsv')
  files.download('meta.tsv')
```


https://projector.tensorflow.org
Embedding Projector
DATA
5 tensors found
Word2Vec 10K
Label by
word
Color by
No color map
Sphereize data
Load data
Publish
Checkpoint: Demo datasets
Metadata: oss_data/word2vec_10000_200d_labels.tsv
T-SNE
PCA
CUSTOM
X
Component #1
Y
Component #2
Z
Component #3
PCA is approximate.
Total variance described: 8.5%.
| Points: 10000 | Dimension: 200
Show All Data
Isolate selection
Clear selection
Search
by
word
BOOKMARKS (0)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Embedding Projector
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5 tensors found
Word2Vec 10K
Label by
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Color by
No color map
Sphereize data
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Checkpoint: Demo datasets
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T-SNE
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X
Component #1
Y
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Z
Component #3
PCA is approximate.
Total variance described: 8.5%.
| Points: 10000 | Dimension: 200
Show All Data
Isolate selection
Clear selection
Search
by
word
BOOKMARKS (0)

Load data from your computer

Step 1: **Load a TSV file of vectors.**

Example of 3 vectors with dimension 4:

```
0.1\t0.2\t0.5\t0.9
0.2\t0.1\t5.0\t0.2
0.4\t0.1\t7.0\t0.8
```

Choose file

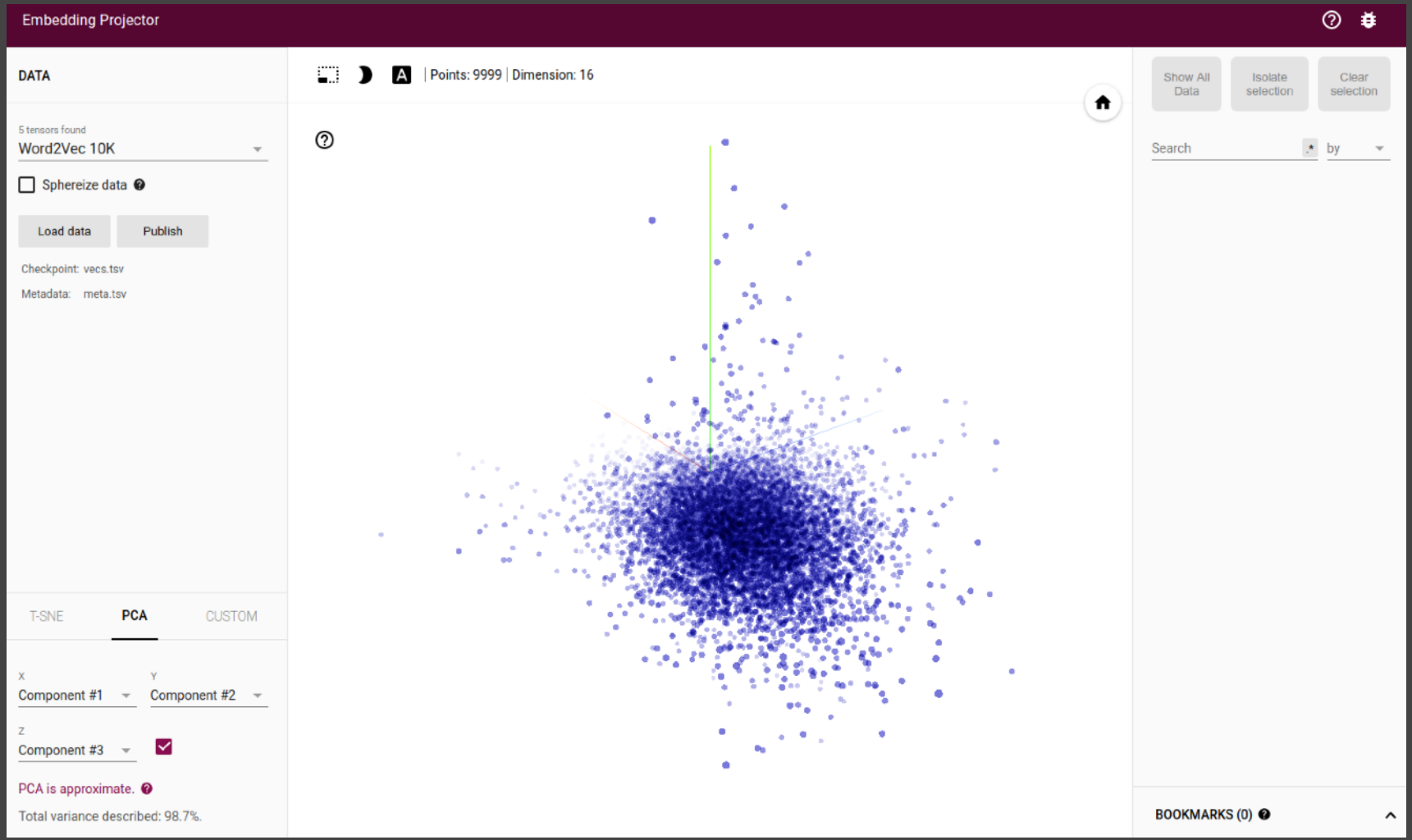
Step 2 (optional): **Load a TSV file of metadata.**

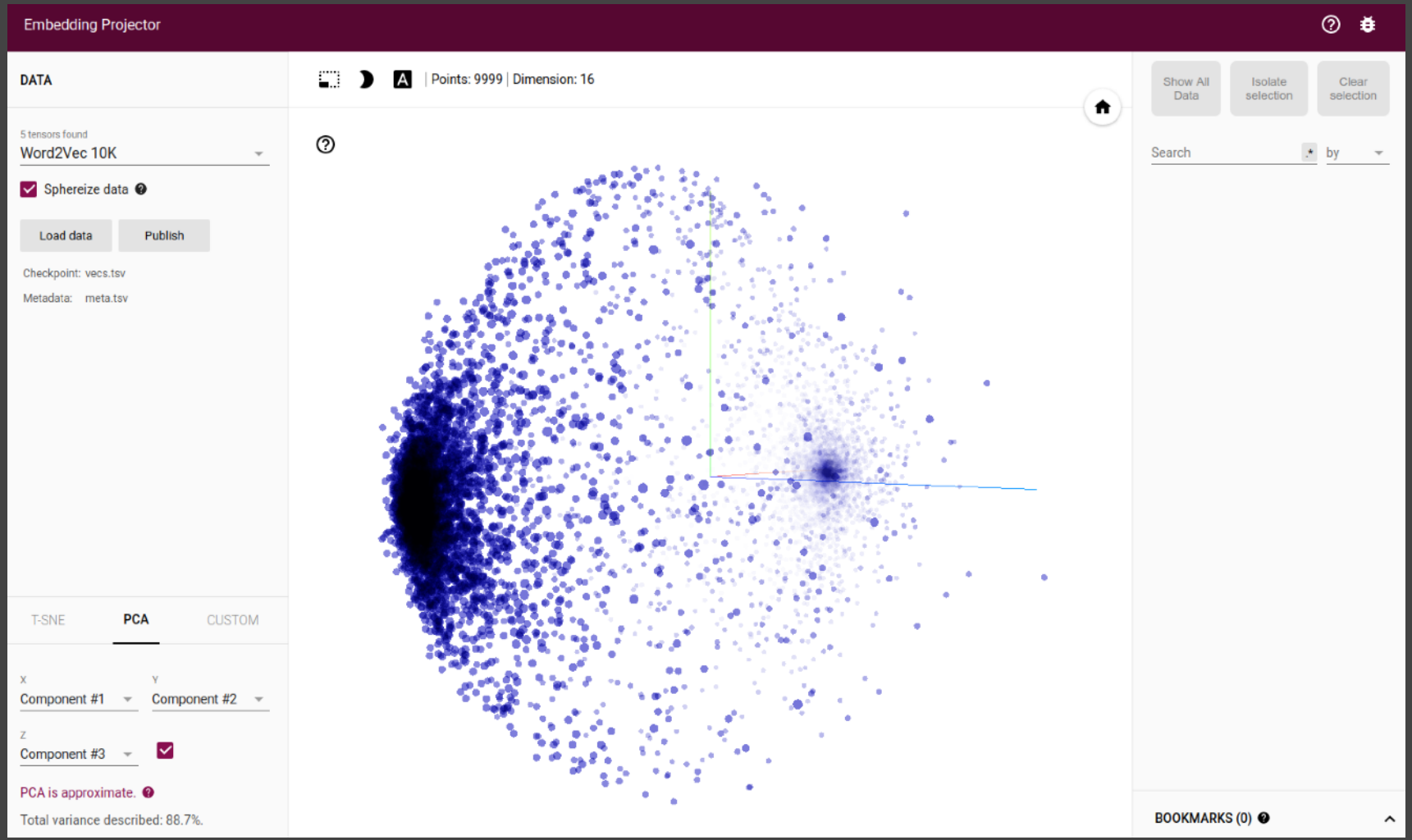
Example of 3 data points and 2 columns.
Note: If there is more than one column, the first row will be parsed as column labels.

```
Pokémon\tSpecies
Wartortle\tTurtle
Venusaur\tSeed
Charmeleon\tFlame
```

Choose file

Click outside to dismiss.


Embedding Projector
DATA
5 tensors found
Word2Vec 10K
Sphereize data
Load data
Publish
Checkpoint: vecs.tsv
Metadata: meta.tsv
T-SNE
PCA
CUSTOM
X
Component #1
Y
Component #2
Z
Component #3
PCA is approximate.
Total variance described: 98.7%.
Points: 9999 | Dimension: 16
Show All Data
Isolate selection
Clear selection
Search
by
BOOKMARKS (0)


Embedding Projector
DATA
5 tensors found
Word2Vec 10K
Sphereize data
Load data
Publish
Checkpoint: vecs.tsv
Metadata: meta.tsv
T-SNE
PCA
CUSTOM
x
Component #1
y
Component #2
z
Component #3
PCA is approximate.
Total variance described: 88.7%.
| Points: 9999 | Dimension: 16
Show All Data
Isolate selection
Clear selection
Search
by
BOOKMARKS (0)

```
import json
import tensorflow as tf

from tensorflow.keras.preprocessing.text import Tokenizer
from tensorflow.keras.preprocessing.sequence import pad_sequences
```

```
vocab_size = 10000
embedding_dim = 16
max_length = 32
trunc_type='post'
padding_type='post'
oov_tok = "<OOV>"
training_size = 20000
```

```
!wget --no-check-certificate \
    https://storage.googleapis.com/laurencemoroney-blog.appspot.com/sarcasm.json \
    -O /tmp/sarcasm.json
```

```
with open("/tmp/sarcasm.json", 'r') as f:
    datastore = json.load(f)

sentences = []
labels = []

for item in datastore:
    sentences.append(item['headline'])
    labels.append(item['is_sarcastic'])
```

```
training_sentences = sentences[0:training_size]
testing_sentences = sentences[training_size:]
training_labels = labels[0:training_size]
testing_labels = labels[training_size:]
```

```
training_sentences = sentences[0:training_size]
testing_sentences = sentences[training_size:]
training_labels = labels[0:training_size]
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```

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```

```
training_sentences = sentences[0:training_size]
testing_sentences = sentences[training_size:]
training_labels = labels[0:training_size]
testing_labels = labels[training_size:]
```

```
tokenizer = Tokenizer(num_words=vocab_size, oov_token=oov_tok)
tokenizer.fit_on_texts(training_sentences)

word_index = tokenizer.word_index

training_sequences = tokenizer.texts_to_sequences(training_sentences)
training_padded = pad_sequences(training_sequences, maxlen=max_length,
                                padding=padding_type, truncating=trunc_type)

testing_sequences = tokenizer.texts_to_sequences(testing_sentences)
testing_padded = pad_sequences(testing_sequences, maxlen=max_length,
                               padding=padding_type, truncating=trunc_type)
```

```
tokenizer = Tokenizer(num_words=vocab_size, oov_token=oov_tok)
tokenizer.fit_on_texts(training_sentences)

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```
tokenizer = Tokenizer(num_words=vocab_size, oov_token=oov_tok)
tokenizer.fit_on_texts(training_sentences)

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training_sequences = tokenizer.texts_to_sequences(training_sentences)
training_padded = pad_sequences(training_sequences, maxlen=max_length,
                                padding=padding_type, truncating=trunc_type)

testing_sequences = tokenizer.texts_to_sequences(testing_sentences)
testing_padded = pad_sequences(testing_sequences, maxlen=max_length,
                               padding=padding_type, truncating=trunc_type)
```

```
tokenizer = Tokenizer(num_words=vocab_size, oov_token=oov_tok)
tokenizer.fit_on_texts(training_sentences)

word_index = tokenizer.word_index

training_sequences = tokenizer.texts_to_sequences(training_sentences)
training_padded = pad_sequences(training_sequences, maxlen=max_length,
                                padding=padding_type, truncating=trunc_type)

testing_sequences = tokenizer.texts_to_sequences(testing_sentences)
testing_padded = pad_sequences(testing_sequences, maxlen=max_length,
                               padding=padding_type, truncating=trunc_type)
```

```
tokenizer = Tokenizer(num_words=vocab_size, oov_token=oov_tok)
tokenizer.fit_on_texts(training_sentences)

word_index = tokenizer.word_index

training_sequences = tokenizer.texts_to_sequences(training_sentences)
training_padded = pad_sequences(training_sequences, maxlen=max_length,
                                padding=padding_type, truncating=trunc_type)

testing_sequences = tokenizer.texts_to_sequences(testing_sentences)
testing_padded = pad_sequences(testing_sequences, maxlen=max_length,
                               padding=padding_type, truncating=trunc_type)
```

```
tokenizer = Tokenizer(num_words=vocab_size, oov_token=oov_tok)
tokenizer.fit_on_texts(training_sentences)

word_index = tokenizer.word_index

training_sequences = tokenizer.texts_to_sequences(training_sentences)
training_padded = pad_sequences(training_sequences, maxlen=max_length,
                                padding=padding_type, truncating=trunc_type)

testing_sequences = tokenizer.texts_to_sequences(testing_sentences)
testing_padded = pad_sequences(testing_sequences, maxlen=max_length,
                               padding=padding_type, truncating=trunc_type)
```

```
model = tf.keras.Sequential([
    tf.keras.layers.Embedding(vocab_size, embedding_dim, input_length=max_length),
    tf.keras.layers.GlobalAveragePooling1D(),
    tf.keras.layers.Dense(24, activation='relu'),
    tf.keras.layers.Dense(1, activation='sigmoid')
])
model.compile(loss='binary_crossentropy',optimizer='adam',metrics=['accuracy'])
```

```
model.summary()
```

```
Layer (type)                 Output Shape              Param #
=================================================================
embedding_2 (Embedding)      (None, 32, 16)            160000
_________________________________________________________________
global_average_pooling1d_2 ( (None, 16)                0
_________________________________________________________________
dense_4 (Dense)              (None, 24)                408
_________________________________________________________________
dense_5 (Dense)              (None, 1)                 25
=================================================================
Total params: 160,433
Trainable params: 160,433
Non-trainable params: 0
```

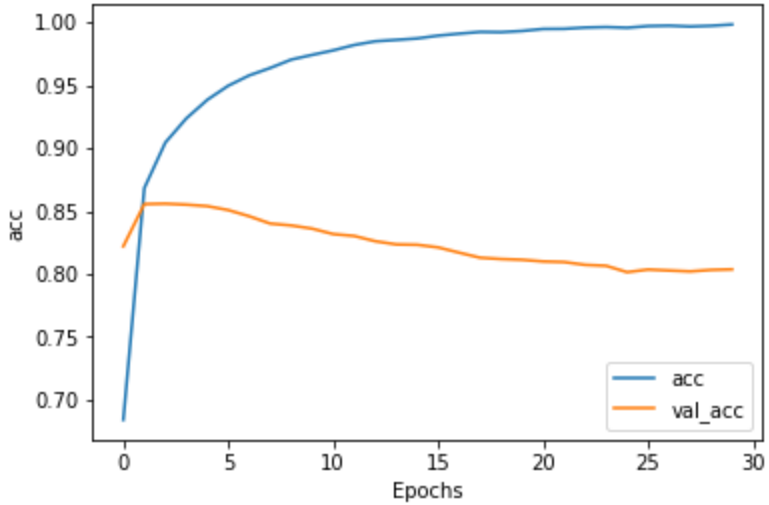
```
num_epochs = 30

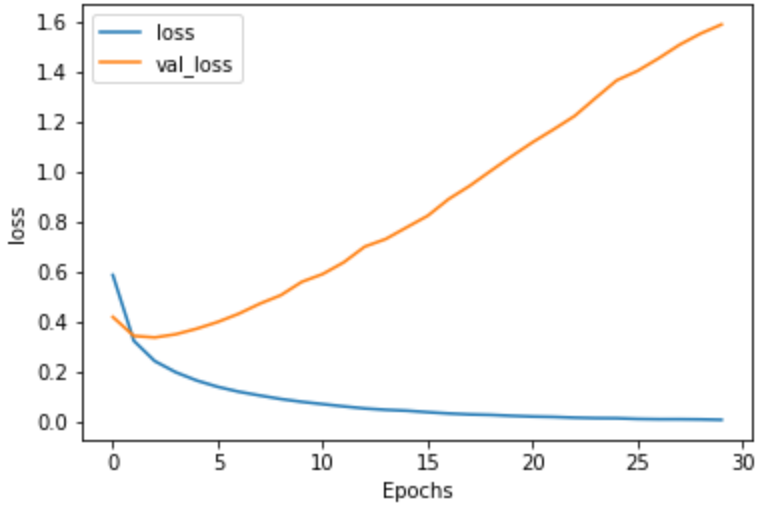
history = model.fit(training_padded, training_labels, epochs=num_epochs,
                    validation_data=(testing_padded, testing_labels), verbose=2)
```

```
import matplotlib.pyplot as plt

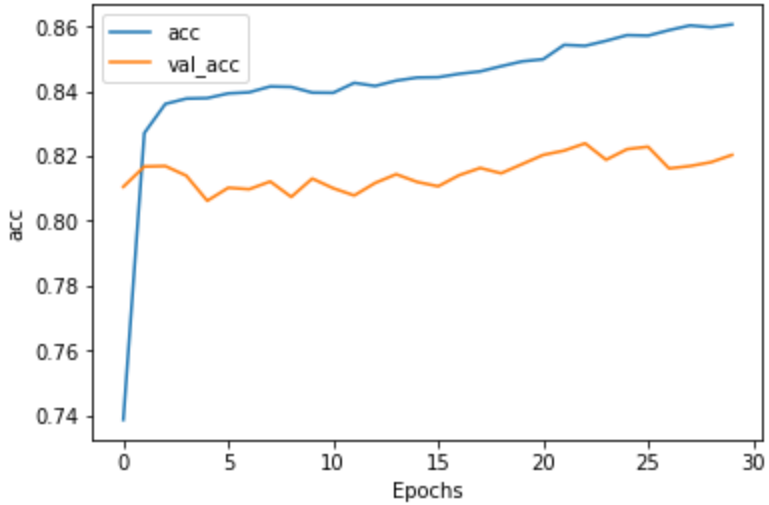

def plot_graphs(history, string):
  plt.plot(history.history[string])
  plt.plot(history.history['val_'+string])
  plt.xlabel("Epochs")
  plt.ylabel(string)
  plt.legend([string, 'val_'+string])
  plt.show()

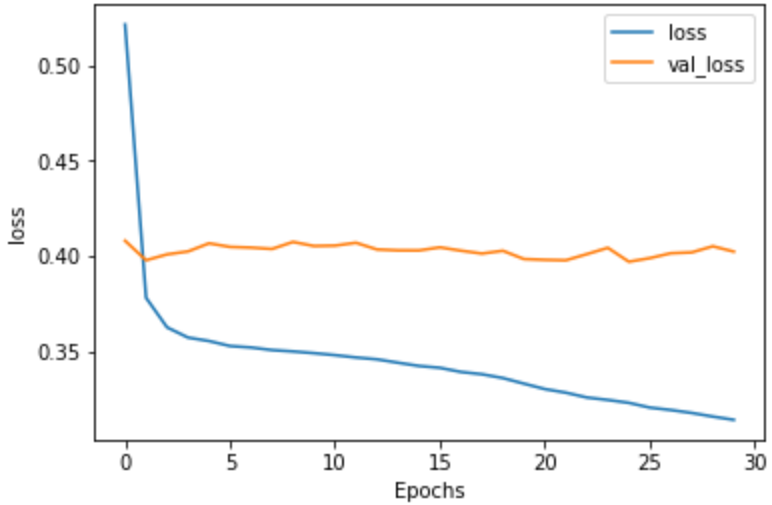
plot_graphs(history, "acc")
plot_graphs(history, "loss")
```


1.00
0.95
0.90
0.85
0.80
0.75
0.70
acc
0
5
10
15
20
25
30
Epochs
acc
val_acc

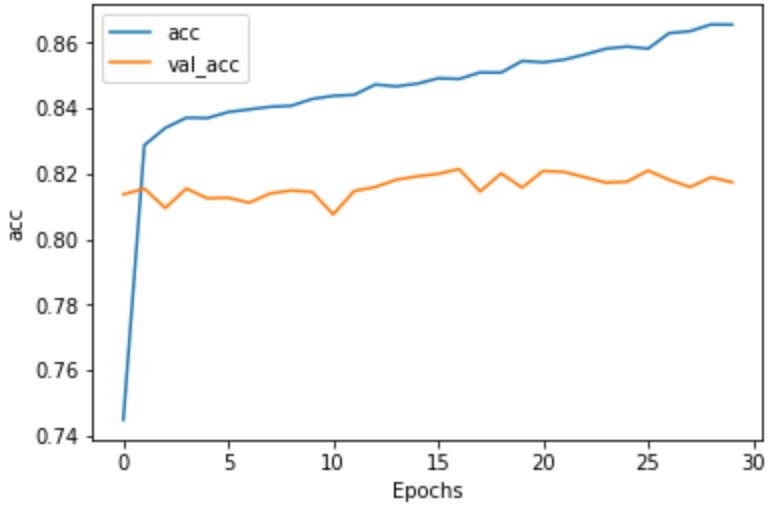

1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
loss
0
5
10
15
20
25
30
Epochs
loss
val_loss

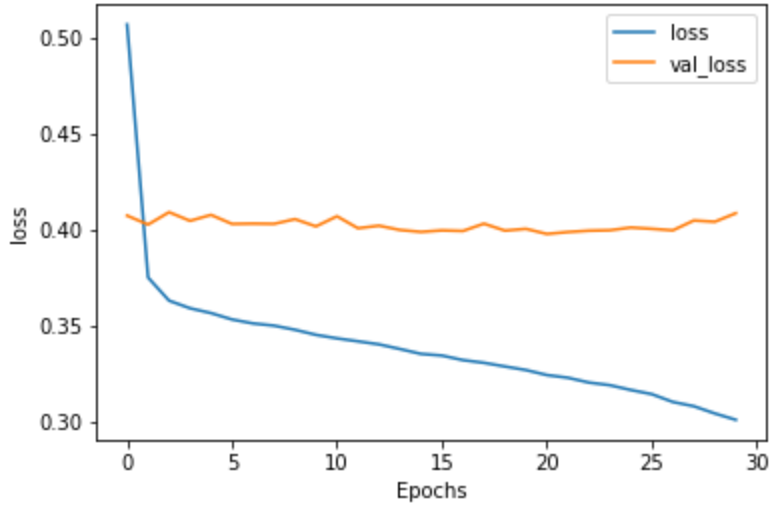
```
vocab_size = 1000    (was 10,000)
embedding_dim = 16
max_length = 16      (was 32)
trunc_type='post'
padding_type='post'
oov_tok = "<OOV>"
training_size = 20000
```


acc
val_acc
0.86
0.84
0.82
0.80
0.78
0.76
0.74
acc
0
5
10
15
20
25
30
Epochs


loss
val_loss
0.50
0.45
0.40
0.35
loss
0
5
10
15
20
25
30
Epochs

```
vocab_size = 1000    (was 10,000)
embedding_dim = 32   (was 16)
max_length = 16      (was 32)
trunc_type='post'
padding_type='post'
oov_tok = "<OOV>"
training_size = 20000
```


acc
val_acc
0.86
0.84
0.82
0.80
0.78
0.76
0.74
acc
0
5
10
15
20
25
30
Epochs


loss
val_loss
0.50
0.45
0.40
0.35
0.30
loss
0
5
10
15
20
25
30
Epochs

https://github.com/tensorflow/datasets/tree/master/docs/catalog

https://github.com/tensorflow/datasets/blob/master/docs/catalog/imdb_reviews.md

275 lines (209 sloc) | 9.65 KB

Raw Blame

imdb_reviews

- **Description**:

Large Movie Review Dataset. This is a dataset for binary sentiment classification containing substantially more data than previous benchmark datasets. We provide a set of 25,000 highly polar movie reviews for training, and 25,000 for testing. There is additional unlabeled data for use as well.

- **Homepage**: http://ai.stanford.edu/~amaas/data/sentiment/
- **Source code**: `tfds.text.IMDBReviews`
- **Versions**:
  - `1.0.0` (default): New split API (https://tensorflow.org/datasets/splits)
- **Download size**: `80.23 MiB`
- **Dataset size**: `Unknown size`
- **Auto-cached** (documentation): Unknown
- **Splits**:

Split	Examples
`'test'`	25,000
`'train'`	25,000
`'unsupervised'`	50,000

https://github.com/tensorflow/datasets/blob/master/docs/catalog/imdb_reviews.md

275 lines (209 sloc) | 9.65 KB

Raw Blame

imdb_reviews/plain_text (default config)

- **Config description**: Plain text
- **Features**:

```
FeaturesDict({
    'label': ClassLabel(shape=(), dtype=tf.int64, num_classes=2),
    'text': Text(shape=(), dtype=tf.string),
})
```

- **Examples** (tfds.as_dataframe):

{% framebox %}

Display examples...

<script> const url = "https://storage.googleapis.com/tfds-data/visualization/dataframe/imdb_reviews-plain_text-1.0.0.html"; const dataButton = document.getElementById('displaydataframe'); dataButton.addEventListener('click', async () => { // Disable the button after clicking (dataframe loaded only once). dataButton.disabled = true;
const contentPane = document.getElementById('dataframecontent'); try { const response = await fetch(url); // Error response codes don't throw an error, so force an error to show // the error message. if (!response.ok) throw Error(response.statusText);

```
const data = await response.text();
contentPane.innerHTML = data;
```

} catch (e) { contentPane.innerHTML = 'Error loading examples. If the error persist, please open ' + 'a new issue.'; } }); </script>

{% endframebox %}

https://github.com/tensorflow/datasets/blob/master/docs/catalog/imdb_reviews.md

275 lines (209 sloc) | 9.65 KB

Raw Blame

imdb_reviews/bytes

- **Config description**: Uses byte-level text encoding with `tfds.deprecated.text.ByteTextEncoder`
- **Features**:

```
FeaturesDict({
    'label': ClassLabel(shape=(), dtype=tf.int64, num_classes=2),
    'text': Text(shape=(None,), dtype=tf.int64, encoder=<ByteTextEncoder vocab_size=257>),
})
```

- **Examples** (tfds.as_dataframe):

{% framebox %}

Display examples...

<script> const url = "https://storage.googleapis.com/tfds-data/visualization/dataframe/imdb_reviews-bytes-1.0.0.html"; const dataButton = document.getElementById('displaydataframe'); dataButton.addEventListener('click', async () => { // Disable the button after clicking (dataframe loaded only once). dataButton.disabled = true;
const contentPane = document.getElementById('dataframecontent'); try { const response = await fetch(url); // Error response codes don't throw an error, so force an error to show // the error message. if (!response.ok) throw Error(response.statusText);

```
const data = await response.text();
contentPane.innerHTML = data;
```

} catch (e) { contentPane.innerHTML = 'Error loading examples. If the error persist, please open ' + 'a new issue.'; } }); </script>

{% endframebox %}

https://github.com/tensorflow/datasets/blob/master/docs/catalog/imdb_reviews.md

275 lines (209 sloc) | 9.65 KB

Raw Blame

imdb_reviews/subwords8k

- **Config description**: Uses `tfds.deprecated.text.SubwordTextEncoder` with 8k vocab size
- **Features**:

```
FeaturesDict({
    'label': ClassLabel(shape=(), dtype=tf.int64, num_classes=2),
    'text': Text(shape=(None,), dtype=tf.int64, encoder=<SubwordTextEncoder vocab_size=8185>),
})
```

- **Examples** (tfds.as_dataframe):

{% framebox %}

Display examples...

<script> const url = "https://storage.googleapis.com/tfds-data/visualization/dataframe/imdb_reviews-subwords8k-1.0.0.html"; const dataButton = document.getElementById('displaydataframe'); dataButton.addEventListener('click', async () => { // Disable the button after clicking (dataframe loaded only once). dataButton.disabled = true;
const contentPane = document.getElementById('dataframecontent'); try { const response = await fetch(url); // Error response codes don't throw an error, so force an error to show // the error message. if (!response.ok) throw Error(response.statusText);

```
const data = await response.text();
contentPane.innerHTML = data;
```

} catch (e) { contentPane.innerHTML = 'Error loading examples. If the error persist, please open ' + 'a new issue.'; } }); </script>

{% endframebox %}

```
import tensorflow_datasets as tfds
imdb, info = tfds.load("imdb_reviews/subwords8k", with_info=True, as_supervised=True)
```

```
train_data, test_data = imdb['train'], imdb['test']
```

```
tokenizer = info.features['text'].encoder
```

tensorflow.org/datasets/api_docs/python/tfds/features/text/SubwordTextEncoder

```
print(tokenizer_subwords.subwords)
```

```
['the_', ', ', '. ', 'a_', 'and_', 'of_', 'to_', 's_', 'is_', 'br', 'in_', 'I_', 'that_', 'this_', 'it_', ... ]
```

```
sample_string = 'TensorFlow, from basics to mastery'

tokenized_string = tokenizer_subwords.encode(sample_string)
print ('Tokenized string is {}'.format(tokenized_string))

original_string = tokenizer_subwords.decode(tokenized_string)
print ('The original string: {}'.format(original_string))
```

```
Tokenized string is [6307, 2327, 4043, 2120, 2, 48, 4249, 4429, 7, 2652, 8050]

The original string: TensorFlow, from basics to mastery
```

```
sample_string = 'TensorFlow, from basics to mastery'

tokenized_string = tokenizer_subwords.encode(sample_string)
print ('Tokenized string is {}'.format(tokenized_string))

original_string = tokenizer_subwords.decode(tokenized_string)
print ('The original string: {}'.format(original_string))
```

```
Tokenized string is [6307, 2327, 4043, 2120, 2, 48, 4249, 4429, 7, 2652, 8050]

The original string: TensorFlow, from basics to mastery
```

```
sample_string = 'TensorFlow, from basics to mastery'

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print ('Tokenized string is {}'.format(tokenized_string))

original_string = tokenizer_subwords.decode(tokenized_string)
print ('The original string: {}'.format(original_string))
```

```
Tokenized string is [6307, 2327, 4043, 2120, 2, 48, 4249, 4429, 7, 2652, 8050]

The original string: TensorFlow, from basics to mastery
```

```
sample_string = 'TensorFlow, from basics to mastery'

tokenized_string = tokenizer_subwords.encode(sample_string)
print ('Tokenized string is {}'.format(tokenized_string))

original_string = tokenizer_subwords.decode(tokenized_string)
print ('The original string: {}'.format(original_string))
```

```
Tokenized string is [6307, 2327, 4043, 2120, 2, 48, 4249, 4429, 7, 2652, 8050]

The original string: TensorFlow, from basics to mastery
```

```
for ts in tokenized_string:
  print ('{} ----> {}'.format(ts, tokenizer_subwords.decode([ts])))
```

```
6307 ----> Ten
2327 ----> sor
4043 ----> Fl
2120 ----> ow
2 ----> ,
48 ----> from
4249 ----> basi
4429 ----> cs
7 ----> to
2652 ----> master
8050 ----> y
```

```
embedding_dim = 64
model = tf.keras.Sequential([
  tf.keras.layers.Embedding(tokenizer_subwords.vocab_size, embedding_dim),
  tf.keras.layers.GlobalAveragePooling1D(),
  tf.keras.layers.Dense(6, activation='relu'),
  tf.keras.layers.Dense(1, activation='sigmoid')
])

model.summary()
```

```
embedding_dim = 64
model = tf.keras.Sequential([
  tf.keras.layers.Embedding(tokenizer_subwords.vocab_size, embedding_dim),
  tf.keras.layers.GlobalAveragePooling1D(),
  tf.keras.layers.Dense(6, activation='relu'),
  tf.keras.layers.Dense(1, activation='sigmoid')
])

model.summary()
```

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
embedding_2 (Embedding)      (None, None, 64)          523840
_________________________________________________________________
global_average_pooling1d_1 ( (None, 64)                0
_________________________________________________________________
dense_4 (Dense)              (None, 6)                 390
_________________________________________________________________
dense_5 (Dense)              (None, 1)                 7
=================================================================
Total params: 524,237
Trainable params: 524,237
Non-trainable params: 0
```

```
num_epochs = 10

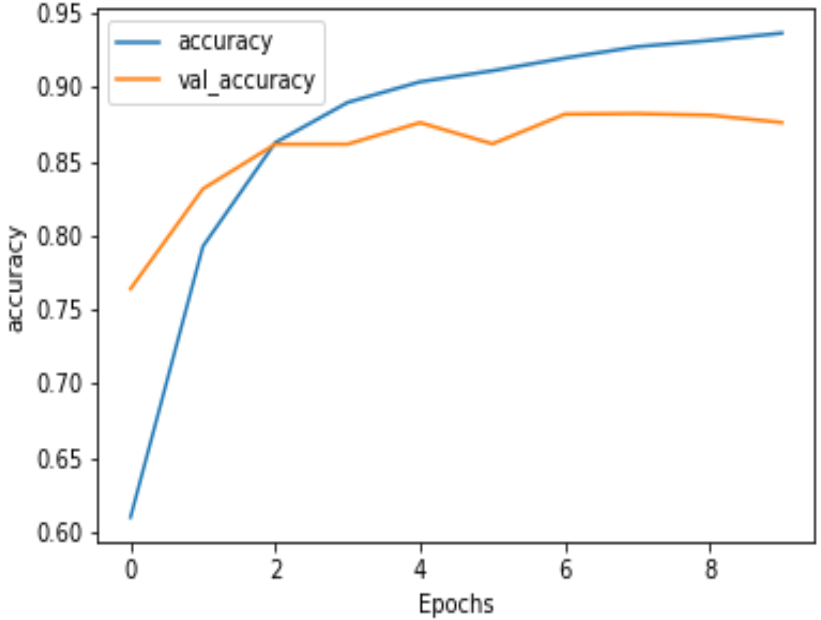
model.compile(loss='binary_crossentropy',
              optimizer='adam',
              metrics=['accuracy'])

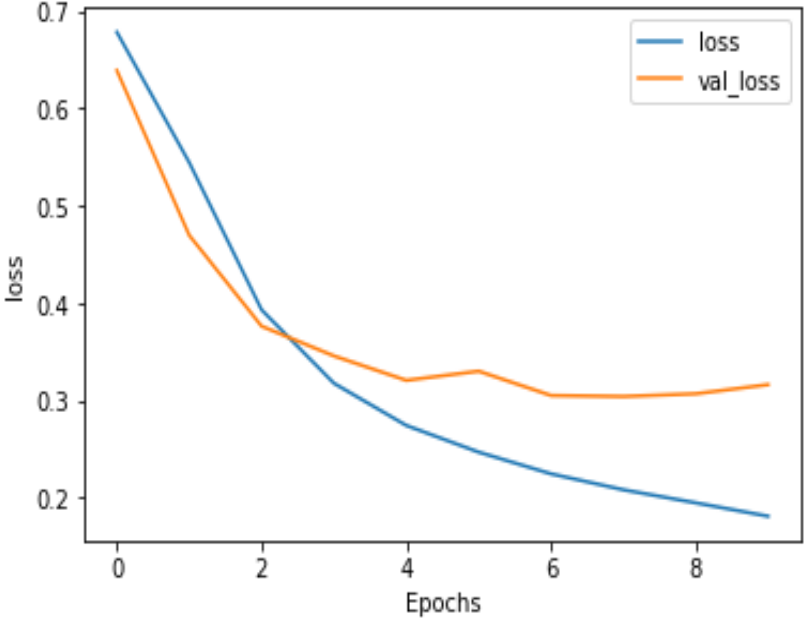
history = model.fit(train_dataset,
                    epochs=num_epochs,
                    validation_data=test_data)
```

```
import matplotlib.pyplot as plt


def plot_graphs(history, string):
  plt.plot(history.history[string])
  plt.plot(history.history['val_'+string])
  plt.xlabel("Epochs")
  plt.ylabel(string)
  plt.legend([string, 'val_'+string])
  plt.show()

plot_graphs(history, "accuracy")
plot_graphs(history, "loss")
```


accuracy
val_accuracy
accuracy
Epochs
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0
2
4
6
8


loss
val_loss
loss
Epochs
0.7
0.6
0.5
0.4
0.3
0.2
0
2
4
6
8