

experimentalrun3

April 19, 2021

```
[1]: #step1 import all the required libraries
#install this version of transformers and pytorch
!pip install transformers==2.8.0
!pip install torch==1.4.0
from transformers import T5Tokenizer, T5ForConditionalGeneration
import tensorflow_datasets as tfds
import torch
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import tensorflow as tf
from tensorflow import keras
import nltk, spacy, re, string, random, time
import matplotlib.pyplot as plt
from gensim.parsing.preprocessing import STOPWORDS
from spacy.lang.en.stop_words import STOP_WORDS
from nltk.tokenize import word_tokenize
from nltk.corpus import stopwords
from sklearn.model_selection import train_test_split
from collections import Counter
from keras.preprocessing.sequence import pad_sequences
from tensorflow.keras.layers import Input, LSTM, Embedding, Dense, Concatenate, TimeDistributed, Bidirectional
from tensorflow.keras.models import Model
from tensorflow.keras.callbacks import EarlyStopping, ReduceLROnPlateau
from attention import AttentionLayer
from keras.initializers import Constant
from keras.optimizers import Adam
from keras import backend as K
from rouge import rouge_n, rouge_l_sentence_level, rouge
from bleau import compute_bleu
#disable eager execution
#tf.compat.v1.disable_eager_execution()
#stopwords removal list
nltk.download('stopwords')
#punkt for tokenization
nltk.download('punkt')
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#for tokenaizations
nltk.download('wordnet')
#combine all the stopwords and create one single list of stopwords
s1=stopwords.words('english')
s2=list(STOP_WORDS)
s3=list(STOPWORDS)
#final list of stopwords
stop_words = s1+s2+s3
#use cuda if available
device = torch.device("cuda:0" if torch.cuda.is_available() else "cpu")

#step2
#contraction are used to replace words with their longer meaningfull counter_
↳parts
contraction = {
    "ain't": "am not / are not / is not / has not / have not",
    "aren't": "are not / am not",
    "can't": "cannot",
    "can't've": "cannot have",
    "'cause": "because",
    "could've": "could have",
    "couldn't": "could not",
    "couldn't've": "could not have",
    "didn't": "did not",
    "doesn't": "does not",
    "don't": "do not",
    "hadn't": "had not",
    "hadn't've": "had not have",
    "hasn't": "has not",
    "haven't": "have not",
    "he'd": "he had / he would",
    "he'd've": "he would have",
    "he'll": "he shall / he will",
    "he'll've": "he shall have / he will have",
    "he's": "he has / he is",
    "how'd": "how did",
    "how'd'y": "how do you",
    "how'll": "how will",
    "how's": "how has / how is / how does",
    "I'd": "I had / I would",
    "I'd've": "I would have",
    "I'll": "I shall / I will",
    "I'll've": "I shall have / I will have",
    "I'm": "I am",
    "I've": "I have",
    "isn't": "is not",
    "it'd": "it had / it would",

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"it'd've": "it would have",
"it'll": "it shall / it will",
"it'll've": "it shall have / it will have",
"it's": "it has / it is",
"let's": "let us",
"ma'am": "madam",
"mayn't": "may not",
"might've": "might have",
"mightn't": "might not",
"mightn't've": "might not have",
"must've": "must have",
"mustn't": "must not",
"mustn't've": "must not have",
"needn't": "need not",
"needn't've": "need not have",
"o'clock": "of the clock",
"oughtn't": "ought not",
"oughtn't've": "ought not have",
"shan't": "shall not",
"sha'n't": "shall not",
"shan't've": "shall not have",
"she'd": "she had / she would",
"she'd've": "she would have",
"she'll": "she shall / she will",
"she'll've": "she shall have / she will have",
"she's": "she has / she is",
"should've": "should have",
"shouldn't": "should not",
"shouldn't've": "should not have",
"so've": "so have",
"so's": "so as / so is",
"that'd": "that would / that had",
"that'd've": "that would have",
"that's": "that has / that is",
"there'd": "there had / there would",
"there'd've": "there would have",
"there's": "there has / there is",
"they'd": "they had / they would",
"they'd've": "they would have",
"they'll": "they shall / they will",
"they'll've": "they shall have / they will have",
"they're": "they are",
"they've": "they have",
"to've": "to have",
"wasn't": "was not",
"we'd": "we had / we would",
"we'd've": "we would have",

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"we'll": "we will",
"we'll've": "we will have",
"we're": "we are",
"we've": "we have",
"weren't": "were not",
"what'll": "what shall / what will",
"what'll've": "what shall have / what will have",
"what're": "what are",
"what's": "what has / what is",
"what've": "what have",
"when's": "when has / when is",
"when've": "when have",
"where'd": "where did",
"where's": "where has / where is",
"where've": "where have",
"who'll": "who shall / who will",
"who'll've": "who shall have / who will have",
"who's": "who has / who is",
"who've": "who have",
"why's": "why has / why is",
"why've": "why have",
"will've": "will have",
"won't": "will not",
"won't've": "will not have",
"would've": "would have",
"wouldn't": "would not",
"wouldn't've": "would not have",
"y'all": "you all",
"y'all'd": "you all would",
"y'all'd've": "you all would have",
"y'all're": "you all are",
"y'all've": "you all have",
"you'd": "you had / you would",
"you'd've": "you would have",
"you'll": "you shall / you will",
"you'll've": "you shall have / you will have",
"you're": "you are",
"you've": "you have",
"rec'd": "received"
}
#rec'd this is my addition to the list of contractions

#step3
#process_text function is used to remove unwanted characters, stopwords, and
↳ format the text to create fewer nulls word embeddings
def process_text(text,contractions,remove_stopwords = True):
    #convert words to lower case

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text = text.lower()

#replace contractions with their longer forms
if True:
    text = text.split()
    new_text = []
    for word in text:
        if word in contractions:
            new_text.append(contractions[word])
        else:
            new_text.append(word)
    text = " ".join(new_text)

#format words and remove unwanted characters
text = re.sub(r'https?:\/\/.*[\r\n]*', '', text, flags=re.MULTILINE) #remove
→https string
text = re.sub(r'\<a href', ' ', text) #remove hyperlink
text = re.sub(r'&#x27;', ' ', text) #remove & in text
text = re.sub(r'[_"\-;%()|+&=*%,.!?:#$@\[\]\/]', ' ', text) #remove unwanted
→characters like punctuation and others
text = re.sub(r'<br />', ' ', text) #remove new line spaces
text = re.sub(r'\/', ' ', text) #remove slashes
text = " ".join(text.split()) #remove trailing spaces
#string.printable returns all sets of punctuation, digits, ascii_letters and
→whitespace.
printable = set(string.printable)
#filter to remove punctuations,digits, ascii_letters and whitespaces
text = "".join(list(filter(lambda x: x in printable, text)))
#remove stop words is true then remove stopwords also
if remove_stopwords:
    text = text.split()
    text = [w for w in text if not w in stop_words]
    text = " ".join(text)

return text

#step4
#get_data function gets the data from gz file into a dataframe and process the
→columns
#stops are not removed for summary they are only removed from text this is done
→to get more human like summaries
#after processing it returns a dataframe
def get_data(contractions):
    st=time.time()
    #load the data into a dataframe

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df = pd.read_json('/content/drive/MyDrive/
↳reviews_Clothing_Shoes_and_Jewelry_5.json.gz', lines=True,
↳compression='gzip')
#drop unwanted columns
df.drop(columns=['reviewerID', 'asin', 'reviewerName',
↳'helpful','overall','unixReviewTime', 'reviewTime'],inplace=True)
print("length of the data",len(df))
#apply preprocess function on the columns of the dataframe
df['reviewText'] = df['reviewText'].apply(lambda x:
↳process_text(x,contractions,remove_stopwords = True))
df['summary'] = df['summary'].apply(lambda x:
↳process_text(x,contractions,remove_stopwords = False))
#write preprocessed data to csv file
df.to_csv("/content/drive/MyDrive/product_reviews.csv",index=False)
print("total time to generate data and write in csv file ",time.time()-st)

```

#step5

#get_embeddings function is used to get the word embeddings

#i am using conceptual number batch word embeddings

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def get_embeddings():
    #get word embeddings
    embeddings_index = {}
    with open('/content/drive/MyDrive/numberbatch-en-19.08.txt',
↳encoding='utf-8') as f:
        for line in f:
            values = line.split(' ')
            word = values[0]
            embedding = np.asarray(values[1:], dtype='float32')
            embeddings_index[word] = embedding

    print('Word embeddings:', len(embeddings_index))
    return embeddings_index

```

#step6

#this function is used to build vocabulary

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def get_vocab(embeddings_index,word_counts,threshold):
    #get the number of missing words
    missing_words={k:v for k,v in word_counts.items() if v >= threshold if k not
↳in embeddings_index.keys()}
    missing_ratio = round(len(missing_words)/len(word_counts),4)*100
    print("Number of words missing from word_embeddings:", len(missing_words))
    print("Percent of words that are missing from our vocabulary: {}%".
↳format(missing_ratio))

```

#mapping vocab to index

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lr=iter([item for item in range(0,len(word_counts))])
vocab_to_int={k:next(lr) for k,v in word_counts.items() if v >= threshold or
↳k in embeddings_index.keys()}

#mapping index to vocab
lr=iter([item for item in range(0,len(word_counts))])
int_to_vocab={next(lr):k for k,v in word_counts.items() if v >= threshold or
↳k in embeddings_index.keys()}

# Special tokens that will be added to our vocab
codes = ["<UNK>","<PAD>","<EOS>","<GO>"]

# Add codes to vocab
for code in codes:
    vocab_to_int[code] = len(vocab_to_int)
    int_to_vocab[len(int_to_vocab)] = code

#print usage of words in our model and their percent
usage_ratio = round(len(vocab_to_int) / len(word_counts),4)*100
print("Total number of unique words:", len(word_counts))
print("Number of words we will use:", len(vocab_to_int))
print("Percent of words we will use: {}".format(usage_ratio))
print("length vocab_to_int",len(vocab_to_int))
print("length int_to_vocab",len(int_to_vocab))

return vocab_to_int,int_to_vocab

#step7
#function to map words with its word embeddings
#if embeddings not found for the word then map it with a random number in
↳range(-1.0,1.0)
def word_embedding_index(vocab_to_int,embeddings_index):
    #using 300 for embedding dimensions to match CN's vectors.
    embedding_dim = 300
    nb_words = len(vocab_to_int)

    # Create matrix with default values of zero
    word_embedding_matrix = np.zeros((nb_words, embedding_dim), dtype=np.float32)
    for word, i in vocab_to_int.items():
        if word in embeddings_index:
            word_embedding_matrix[i] = embeddings_index[word]
        else:
            # If word not in CN, create a random embedding for it
            new_embedding = np.array(np.random.uniform(-1.0, 1.0, embedding_dim))
            #embeddings_index[word] = new_embedding
            word_embedding_matrix[i] = new_embedding

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# Check if value matches len(vocab_to_int)
print("length of word embedding matrix",len(word_embedding_matrix))
return word_embedding_matrix

#step8
#append unk and eos tokens
#if eos is equal to true then append go and eos token at begining and end of
→the summary
#add unknown token for word not found in vocabulary
def convert_to_ints(text,vocab_to_int,eos=False):
    ints = []
    for word in text.split():
        if word in vocab_to_int:
            ints.append(vocab_to_int[word])
        else:
            ints.append(vocab_to_int["<UNK>"])
    if eos:
        ints.insert(0,vocab_to_int["<GO>"])
        ints.insert(len(ints),vocab_to_int["<EOS>"])
    return ints

#step9
#count unknown tokens
def count_unk(text):
    unk=0
    eos=0
    #print(text)
    for value in text:
        if 41413 in value:
            unk+=1
    return unk

#step10
def counts(val):
    c=0
    for i in val:
        try:
            if i==41413:
                c+=1
        except:
            pass
    return c

#step11
#remove rows from data frame that dosent staisfy the condition this is done so
→model is trained with proper data
#redundancey is less and input text is accurate

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def get_refined_output(df,max_rl,max_sl):
    unk_rl=1 #unknown token review limit
    unk_sl=0 #unknown token summary limit
    min_rl=2 #minimum review length
    #get the total length of reviewText this is used for sorting
    df["total_length"]=df['reviewText'].apply(lambda x: len(x))
    #get reviewText whose length is greater then minimum review length
    df=df[df['reviewText'].apply(lambda x: len(x)>=min_rl)]
    #get reviewText whose length is less than maximum review length
    df=df[df['reviewText'].apply(lambda x: len(x)<=max_rl)]
    #filter out the unknown tokens based on unknown token reviewText limit
    df=df[df['reviewText'].apply(lambda x: counts(x)<=unk_rl)]
    #get summary whose length is less than maximum summary length
    df=df[df['summary'].apply(lambda x: len(x)<=max_sl)]
    #filter out the unknown tokens based on unknown token summary limit
    df=df[df['summary'].apply(lambda x: counts(x)<=unk_sl)]
    #sort the values in ascending order
    df.sort_values(by=["total_length"],ascending=True,inplace=True)
    #drop unwanted columns
    df.drop(columns=["total_length","word"],inplace=True)
    #reset index
    df.reset_index(drop=True,inplace=True)
    return df

#step12
#function to plot the length of training, validation and testing
def plot_tr_tval_tt_len(xtr,xval,xtt):
    names = ['Training','Validation','Testing']
    values = [len(xtr),len(xval),len(xtt)]
    plt.figure(figsize=(10,5))
    plt.subplot(131)
    plt.
    →bar(names,values,color=['darkorange','coral','coral'],edgecolor='darkblue')
    plt.suptitle('Categorical Plotting')
    plt.show()

#step13
#function to plot loss and accuracy curves on training and validation set
def plotgraph(history):
    plt.figure(figsize=[8,6])
    plt.plot(history.history['loss'],'firebrick',linewidth=3.0)
    plt.plot(history.history['accuracy'],'turquoise',linewidth=3.0)
    plt.plot(history.history['val_loss'],'midnightblue',linewidth=3.0)
    plt.legend(['Training loss','Training Accuracy','Validation_
    →loss'],fontsize=18)
    plt.xlabel('Epochs',fontsize=16)
    plt.ylabel('Loss and Accuracy',fontsize=16)

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plt.title('Loss Curves and Accuracy Curves for text_
↳summarization',fontsize=16)

#step14
#this function is used to get the preprocessed csv file for our text summarizer
def Get_the_data():
    #lower the string in contractions and convert it into dict
    contractions = dict((k.lower(), v.lower()) for k, v in contraction.items())
    #till this step all data is processed and we get our csv file of cleaned texts
    get_data(contractions)

    #free memory
    del contractions

#step15 is used to call function Get_the_data which get the preprocessed data_
↳and writes it into a csv file
#Get_the_data()

#step16
#this function combines all the above ouput generated by the above function in_
↳a proper sequence of steps
def combining_all_steps():

    st=time.time()
    #get the final cleaned data
    df=pd.read_csv('/content/drive/MyDrive/product_reviews.csv')[:100000]
    print("The length of dataset is ",len(df))
    #combine reviewText and summary so common vocabulary can be created by_
↳finding frequent words
    df["word"]=df[['reviewText','summary']].apply(lambda x : '{} {}'.
↳format(x[0],x[1]), axis=1)
    #get frequency of words
    word_counts=pd.Series(np.concatenate([x.split() for x in df.word])).
↳value_counts()
    word_counts=word_counts.to_dict()
    #print(type(word_counts))
    print("vocab length",len(word_counts))
    #set the threshold
    threshold = 20
    max_rl=80 #maximum review length
    max_sl=10 #maximum summary length
    #get the embeddings matrix
    embeddings_index= get_embeddings()
    #get vocab to index and index to vocab mapping of words
    vocab_to_int,int_to_vocab=get_vocab(embeddings_index,word_counts,threshold)
    #get word embedding for the words in vocab

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word_embedding_matrix=word_embedding_index(vocab_to_int,embeddings_index)
#convert words to integers based on their index positions
df['reviewText'] = df['reviewText'].apply(lambda x:
→convert_to_ints(str(x),vocab_to_int,eos=False))
df['summary'] = df['summary'].apply(lambda x:
→convert_to_ints(str(x),vocab_to_int,eos=True))
print("after word to index for reviewText",df["reviewText"][0])
print("after word to index for summary",df["summary"][0])
rvunk=count_unk(df["reviewText"])
smunk=count_unk(df["summary"])
print("total number of unk token are",rvunk+smunk)
#apply the filters and get the final preprocessed data
df=get_refined_output(df,max_rl,max_sl)
print("length of dataset that will be used",len(df))
#split data into 75% train, 15% validation and 15% test datasets
□
→x_tr,x_val,y_tr,y_val=train_test_split(df['reviewText'],df['summary'],test_size=0.
→3,random_state=1,shuffle=True)
x_tt,x_val,y_tt,y_val=train_test_split(x_val,y_val,test_size=0.
→5,random_state=1,shuffle=True)
print("length of split datasets train {}, test {} and validation {}".
→format(len(x_tr),len(x_tt),len(x_val)))
print("Vocabulary Size: {}".format(len(vocab_to_int)))
□
→print("voc_to_int_",vocab_to_int['<UNK>'],vocab_to_int['<PAD>'],vocab_to_int['<EOS>'])
#reset index
x_tr=x_tr.reset_index()
y_tr=y_tr.reset_index()
x_tt=x_tt.reset_index()
y_tt=y_tt.reset_index()
x_val=x_val.reset_index()
y_val=y_val.reset_index()
#find max lenght just to verfiy the output of get refined function
#max([len(sentence) for sentence in y_tt["summary"]])
#pad the reviewText and summary to the specified max length
xtr=pad_sequences(x_tr["reviewText"], padding='post',maxlen=max_rl,
→value=vocab_to_int["<PAD>"])
ytr=pad_sequences(y_tr["summary"], padding='post',maxlen=max_sl,
→value=vocab_to_int["<PAD>"])
xtt=pad_sequences(x_tt["reviewText"], padding='post',maxlen=max_rl,
→value=vocab_to_int["<PAD>"])
ytt=pad_sequences(y_tt["summary"], padding='post',maxlen=max_sl,
→value=vocab_to_int["<PAD>"])
xval=pad_sequences(x_val["reviewText"], padding='post',maxlen=max_rl,
→value=vocab_to_int["<PAD>"])

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yval=pad_sequences(y_val["summary"], padding='post',maxlen=max_sl,
↳value=vocab_to_int("<PAD>"))
#find the number of unique tokens in the list
#flat_list_rt = [item for sublist in df["reviewText"] for item in sublist]
#flat_list_s = [item for sublist in df["summary"] for item in sublist]
#rt=len(np.unique(flat_list_rt))
#st=len(np.unique(flat_list_s))
#print("number of unique tokens reviewText {} and summary {}".format(rt,st))
#plot the length of training, validation and testing
plot_tr_tval_tt_len(xtr,xval,xtt)
print("total time to complete all the above steps and get final data ",time.
↳time()-st)
#free memory delete values stored in variables which are not required further
del df,word_counts,embeddings_index,x_tr,x_val,y_tr,y_val,x_tt,y_tt

return
↳xtr,ytr,xtt,ytt,xval,yval,vocab_to_int,int_to_vocab,word_embedding_matrix,max_rl,max_sl

#step17
#function to get summary given a sequence
def seq_to_summary(seq,vocab_to_int,int_to_vocab):
    newstring=''
    for i in seq:
        if ((i!=0 and i!=vocab_to_int['<GO>']) and i!=vocab_to_int['<EOS>']):
            newstring=newstring+int_to_vocab[i]+' '
    return newstring

#step18
#function to get text given a sequence
def seq_to_text(seq,int_to_vocab):
    newstring=''
    for i in seq:
        if (i!=0):
            newstring=newstring+int_to_vocab[i]+' '
    return newstring

#step19
#this function get the data for the pretrained model t5small
def combining_all_steps_t5():
    #get the final cleaned data
    df=pd.read_csv('/content/drive/MyDrive/product_reviews.csv')[:117799]
    print("The length of dataset is ",len(df))

    #set the threshold
    threshold = 20
    max_rl=200 #maximum review length
    max_sl=10 #maximum summary length

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#get reviewText whose length is less than maximum review length
df['reviewText']=df['reviewText'].str.slice(0,max_rl)

#get summary whose length is less than maximum summary length
df['summary']=df['summary'].str.slice(0,max_rl)

#split data into 75% train, 15% validation and 15% test datasets
↳
↳x_tr,x_val,y_tr,y_val=train_test_split(df['reviewText'],df['summary'],test_size=0.
↳3,random_state=1,shuffle=True)
x_tt,x_val,y_tt,y_val=train_test_split(x_val,y_val,test_size=0.
↳5,random_state=1,shuffle=True)

#reset index
x_tr=x_tr.reset_index()
y_tr=y_tr.reset_index()
x_tt=x_tt.reset_index()
y_tt=y_tt.reset_index()
x_val=x_val.reset_index()
y_val=y_val.reset_index()
print("train {}, val {}, test {}".format(len(x_tr),len(x_val),len(x_tt)))
return x_tr,y_tr,x_tt,y_tt,x_val,y_val

```

Collecting transformers==2.8.0

Downloading <https://files.pythonhosted.org/packages/a3/78/92cedda05552398352ed9784908b834ee32a0bd071a9b32de287327370b7/transformers-2.8.0-py3-none-any.whl> (563kB)

| 573kB 6.4MB/s

Requirement already satisfied: numpy in /usr/local/lib/python3.7/dist-packages (from transformers==2.8.0) (1.19.5)

Requirement already satisfied: regex!=2019.12.17 in /usr/local/lib/python3.7/dist-packages (from transformers==2.8.0) (2019.12.20)

Collecting sentencepiece

Downloading https://files.pythonhosted.org/packages/f5/99/e0808cb947ba10f575839c43e8fafc9cc44e4a7a2c8f79c60db48220a577/sentencepiece-0.1.95-cp37-cp37m-manylinux2014_x86_64.whl (1.2MB)

| 1.2MB 10.9MB/s

Requirement already satisfied: tqdm>=4.27 in

/usr/local/lib/python3.7/dist-packages (from transformers==2.8.0) (4.41.1)

Collecting boto3

Downloading <https://files.pythonhosted.org/packages/fc/79/64c0815cbe8c6abd7fe5525ec37a2689d3cf10e387629ba4a6e44daff6d0/boto3-1.17.49-py2.py3-none-any.whl> (131kB)

| 133kB 23.1MB/s

Requirement already satisfied: filelock in /usr/local/lib/python3.7/dist-packages (from transformers==2.8.0) (3.0.12)

```

Collecting sacremoses
  Downloading https://files.pythonhosted.org/packages/08/cd/342e584ee544d0
44fb573ae697404ce22ede086c9e87ce5960772084cad0/sacremoses-0.0.44.tar.gz (862kB)
    |                                     | 870kB 17.7MB/s
Collecting tokenizers==0.5.2
  Downloading https://files.pythonhosted.org/packages/d6/e3/5e49e9a83fb605
aaa34a1c1173e607302fecae529428c28696fb18f1c2c9/tokenizers-0.5.2-cp37-cp37m-manyl
inux1_x86_64.whl (5.6MB)
    |                                     | 5.6MB 18.8MB/s
Requirement already satisfied: requests in /usr/local/lib/python3.7/dist-
packages (from transformers==2.8.0) (2.23.0)
Collecting s3transfer<0.4.0,>=0.3.0
  Downloading https://files.pythonhosted.org/packages/98/14/0b4be62b65c52d
6d1c442f24e02d2a9889a73d3c352002e14c70f84a679f/s3transfer-0.3.6-py2.py3-none-
any.whl (73kB)
    |                                     | 81kB 6.1MB/s
Collecting jmespath<1.0.0,>=0.7.1
  Downloading https://files.pythonhosted.org/packages/07/cb/5f001272b6faeb23c1c9
e0acc04d48eaaf5c862c17709d20e3469c6e0139/jmespath-0.10.0-py2.py3-none-any.whl
Collecting boto3<1.21.0,>=1.20.49
  Downloading https://files.pythonhosted.org/packages/68/59/6e28ce58206039
ad2592992b75ee79a8f9dbc902a9704373ddacc4f96300/boto3-1.20.49-py2.py3-none-
any.whl (7.4MB)
    |                                     | 7.4MB 43.0MB/s
Requirement already satisfied: six in /usr/local/lib/python3.7/dist-
packages (from sacremoses->transformers==2.8.0) (1.15.0)
Requirement already satisfied: click in /usr/local/lib/python3.7/dist-packages
(from sacremoses->transformers==2.8.0) (7.1.2)
Requirement already satisfied: joblib in /usr/local/lib/python3.7/dist-packages
(from sacremoses->transformers==2.8.0) (1.0.1)
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-
packages (from requests->transformers==2.8.0) (2.10)
Requirement already satisfied: certifi>=2017.4.17 in
/usr/local/lib/python3.7/dist-packages (from requests->transformers==2.8.0)
(2020.12.5)
Requirement already satisfied: urllib3!=1.25.0,!1.25.1,<1.26,>=1.21.1 in
/usr/local/lib/python3.7/dist-packages (from requests->transformers==2.8.0)
(1.24.3)
Requirement already satisfied: chardet<4,>=3.0.2 in
/usr/local/lib/python3.7/dist-packages (from requests->transformers==2.8.0)
(3.0.4)
Requirement already satisfied: python-dateutil<3.0.0,>=2.1 in
/usr/local/lib/python3.7/dist-packages (from
boto3<1.21.0,>=1.20.49->boto3->transformers==2.8.0) (2.8.1)
Building wheels for collected packages: sacremoses
  Building wheel for sacremoses (setup.py) ... done
  Created wheel for sacremoses: filename=sacremoses-0.0.44-cp37-none-any.whl
size=886084

```

```

sha256=c53f894cbd438cd592d46ece928b0c7e8a9410ce453db7a88f7f07cae50a1749
  Stored in directory: /root/.cache/pip/wheels/3e/fb/c0/13ab4d63d537658f44836674
4654323077c4d90069b6512f3c
Successfully built sacremoses
ERROR: boto3 1.20.49 has requirement urllib3<1.27,>=1.25.4, but you'll
have urllib3 1.24.3 which is incompatible.
Installing collected packages: sentencepiece, jmespath, boto3, s3transfer,
boto3, sacremoses, tokenizers, transformers
Successfully installed boto3-1.17.49 botocore-1.20.49 jmespath-0.10.0
s3transfer-0.3.6 sacremoses-0.0.44 sentencepiece-0.1.95 tokenizers-0.5.2
transformers-2.8.0
Collecting torch==1.4.0
  Downloading https://files.pythonhosted.org/packages/1a/3b/fa92ece1e58a6a
48ec598bab327f39d69808133e5b2fb33002ca754e381e/torch-1.4.0-cp37-cp37m-manylinux1
_x86_64.whl (753.4MB)
    | 753.4MB 22kB/s
ERROR: torchvision 0.9.1+cu101 has requirement torch==1.8.1, but you'll
have torch 1.4.0 which is incompatible.
ERROR: torchtext 0.9.1 has requirement torch==1.8.1, but you'll have torch
1.4.0 which is incompatible.
Installing collected packages: torch
  Found existing installation: torch 1.8.1+cu101
  Uninstalling torch-1.8.1+cu101:
    Successfully uninstalled torch-1.8.1+cu101
Successfully installed torch-1.4.0
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data]   Unzipping corpora/wordnet.zip.

```

```

[2]: #step20
      #function to design and evaluate the model
      def
      ↪ design_model_fit_eval(xtr,ytr,xval,yval,vocab_to_int,word_embedding_matrix,max_rl):
      ↪
        K.clear_session()
        latent_dim = 80
        embedding_dim=300

        # Encoder
        encoder_inputs = Input(shape=(max_rl,))

        #embedding layer

```

```

enc_emb = Embedding(len(vocab_to_int),
                    embedding_dim,
                    embeddings_initializer=Constant(word_embedding_matrix),
                    trainable=False)(encoder_inputs)

#LSTM 1
encoder_lstm1 = LSTM(latent_dim,return_sequences=True,return_state=True)
encoder_output1, state_h1, state_c1 = encoder_lstm1(enc_emb)

#LSTM 2
encoder_lstm2 = LSTM(latent_dim,return_sequences=True,return_state=True)
encoder_output2, state_h2, state_c2 = encoder_lstm2(encoder_output1)

#LSTM 3
encoder_lstm3=LSTM(latent_dim, return_state=True, return_sequences=True)
encoder_outputs, state_h, state_c= encoder_lstm3(encoder_output2)

# Set up the decoder, using `encoder_states` as initial state.
decoder_inputs = Input(shape=(None,))

#embedding layer
dec_emb_layer = Embedding(len(vocab_to_int),
                          embedding_dim,
                          ↵
↳embeddings_initializer=Constant(word_embedding_matrix),
                          trainable=False)

#decoder
dec_emb = dec_emb_layer(decoder_inputs)

decoder_lstm = LSTM(latent_dim, return_sequences=True,↵
↳return_state=True,dropout=0.4,recurrent_dropout=0.2)
decoder_outputs,decoder_fwd_state, decoder_back_state =↵
↳decoder_lstm(dec_emb,initial_state=[state_h, state_c])

# Attention layer
attn_layer = AttentionLayer(name='attention_layer')
attn_out, attn_states = attn_layer([encoder_outputs, decoder_outputs])

# Concat attention input and decoder LSTM output
decoder_concat_input = Concatenate(axis=-1,↵
↳name='concat_layer')([decoder_outputs, attn_out])

#dense layer
decoder_dense = TimeDistributed(Dense(len(vocab_to_int),↵
↳activation='softmax'))

```



```

decoder_outputs = decoder_dense(decoder_concat_input)

# Define the model
model = Model([encoder_inputs, decoder_inputs], decoder_outputs)

#print model summary
model.summary()

model.compile(optimizer='rmsprop',loss='sparse_categorical_crossentropy',metrics=['accuracy'])
#reduce_lr method is used to reduce the learning rate if the learning rate is
stagnant or if there are no major improvements in training
reduce_lr = ReduceLROnPlateau(monitor='val_loss', factor=0.2,
                              patience=5, min_lr=0.001)

#early stopping condition
es = EarlyStopping(monitor='val_loss', mode='min', verbose=1)

st=time.time()

#fit te model
history=model.fit([xtr,ytr[:,:,:-1]], ytr.reshape(ytr.shape[0],ytr.shape[1],
→1)[:,:1], epochs=100,callbacks=[es],batch_size=512,
→validation_data=([xval,yval[:,:,:-1]], yval.reshape(yval.shape[0],yval.
→shape[1], 1)[:,:1]))

#plot loss and accuracy curves
plotgraph(history)
print("total time required for training ",time.time()-st)
return encoder_inputs,encoder_outputs, state_h,
→state_c,decoder_inputs,decoder_lstm,attn_layer,decoder_dense,dec_emb_layer

```

```

[3]: #step21
#design of inference function
def design_inference(encoder_inputs,encoder_outputs, state_h,
→state_c,decoder_inputs,decoder_lstm,attn_layer,decoder_dense,max_rl,dec_emb_layer):
→
#latent dimension
latent_dim = 80

#encode the input sequence to get the feature vector
encoder_model = Model(inputs=encoder_inputs,outputs=[encoder_outputs,
→state_h, state_c])

#decoder setup
#below tensors will hold the states of the previous time step
decoder_state_input_h = Input(shape=(latent_dim,))
decoder_state_input_c = Input(shape=(latent_dim,))

```

```

decoder_hidden_state_input = Input(shape=(max_r1,latent_dim))

#get the embeddings of the decoder sequence
dec_emb2= dec_emb_layer(decoder_inputs)
#to predict the next word in the sequence, set the initial states to the
→states from the previous time step
decoder_outputs2, state_h2, state_c2 = decoder_lstm(dec_emb2,
→initial_state=[decoder_state_input_h, decoder_state_input_c])

#attention inference
attn_out_inf, attn_states_inf = attn_layer([decoder_hidden_state_input,
→decoder_outputs2])
decoder_inf_concat = Concatenate(axis=-1, name='concat')([decoder_outputs2,
→attn_out_inf])

#a dense softmax layer to generate prob dist. over the target vocabulary
decoder_outputs2 = decoder_dense(decoder_inf_concat)

#final decoder model
decoder_model = Model([decoder_inputs] +
→[decoder_hidden_state_input,decoder_state_input_h, decoder_state_input_c],
                      [decoder_outputs2] + [state_h2, state_c2])

return encoder_model,decoder_model

```

```

[4]: #step22
#function to get the decoded sequence for the given review
def
→decode_sequence(input_seq,encoder_model,decoder_model,vocab_to_int,int_to_vocab,max_sl):
→
    # Encode the input as state vectors.
    e_out, e_h, e_c = encoder_model.predict(input_seq)

    # Generate empty target sequence of length 1.
    target_seq = np.zeros((1,1))

    # Populate the first word of target sequence with the start word.
    target_seq[0, 0] = vocab_to_int['<GO>']

    stop_condition = False
    decoded_sentence = ''
    while not stop_condition:
        output_tokens, h, c = decoder_model.predict([target_seq] + [e_out, e_h,
→e_c])

        # Sample a token

```

```

sampled_token_index = np.argmax(output_tokens[0, -1, :])
sampled_token = int_to_vocab[sampled_token_index]

if (sampled_token!="<EOS>"):
    decoded_sentence += ' '+sampled_token

    # Exit condition: either hit max length or find stop word.
    if (sampled_token == '<EOS>' or len(decoded_sentence.split()) >=
→(max_sl-1)):
        stop_condition = True

    # Update the target sequence (of length 1).
    target_seq = np.zeros((1,1))
    target_seq[0, 0] = sampled_token_index

    # Update internal states
    e_h, e_c = h, c

return decoded_sentence

```

```

[5]: #step23
#this function is used to get the score for LSTM scratch model designed and
→puts output in a txt file
def
→test_scratch(xtt,ytt,int_to_vocab,vocab_to_int,encoder_model,decoder_model,max_sl,max_rl):
→
    st=time.time()
    predictions = []
    real_og=[]
    pred_op=[]
    c=0
    b=50
    for i in range(0,len(xtt)):
        #review
        review=seq_to_text(xtt[i],int_to_vocab)
        review=review.replace("<PAD>","")
        #original summary
        og_summary=seq_to_summary(ytt[i],vocab_to_int,int_to_vocab)
        og_summary=og_summary.replace("<PAD>","")
        real_og.append(str(og_summary))
        #predicted summary
        predict_summary=decode_sequence(xtt[i].
→reshape(1,max_rl),encoder_model,decoder_model,vocab_to_int,int_to_vocab,max_sl)
        predict_summary=predict_summary.replace("<PAD>","")
        pred_op.append(str(predict_summary))
        #write to a text file name review_og_pred.txt

```

```

        predictions.append("review:"+review+"\t"+"original:
→"+og_summary+"\t"+"predicted:"+predict_summary+"\n")
        if c>b:
            print("Review: {}".format(review))
            print("Original Summary: {}".format(og_summary))
            print("Predicted Summary: {}".format(predict_summary))
            b+=b
            c+=1

    print("total time to complete {}".format(time.time()-st))
    file = open("/content/drive/MyDrive/LSTMscore.txt","w")
    file.writelines(predictions)
    file.close()

    bleau=compute_bleu(real_op,pred_op, max_order=4,smooth=False)
    rougen=rouge_n(pred_op, real_op, n=2)
    ro=rouge(pred_op, real_op)

    print("bleu, precisions, bp, ratio, translation_length,
→reference_length",bleau)
    print("rouge2",rougen)
    print("rouge",ro)

```

```

[6]: #step24
def lstmmodel():
    #this the model designed by me for text summarization
    st=time.time()
    #get the data
    □
    →xtr,ytr,xtt,ytt,xval,yval,vocab_to_int,int_to_vocab,word_embedding_matrix,max_rl,max_sl=com
    #call the model
    encoder_inputs,encoder_outputs, state_h,□
    →state_c,decoder_inputs,decoder_lstm,attn_layer,decoder_dense,dec_emb_layer=design_model_fit
    #get the inference output
    encoder_model,decoder_model=design_inference(encoder_inputs,encoder_outputs,□
    →state_h,□
    →state_c,decoder_inputs,decoder_lstm,attn_layer,decoder_dense,max_rl,dec_emb_layer)
    #call test
    □
    →test_scratch(xtt,ytt,int_to_vocab,vocab_to_int,encoder_model,decoder_model,max_sl,max_rl)
    print("total time required for completing whole process ",time.time()-st)

```

```

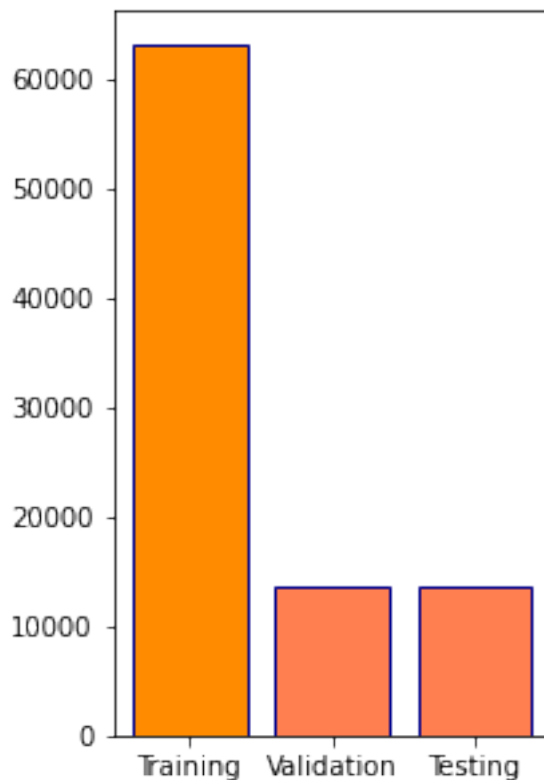
[7]: lstmmodel()

```

The length of dataset is 100000
 vocab length 52034
 Word embeddings: 516783

Number of words missing from word_embeddings: 450
Percent of words that are missing from our vocabulary: 0.86%
Total number of unique words: 52034
Number of words we will use: 31815
Percent of words we will use: 61.14000000000001%
length vocab_to_int 31815
length int_to_vocab 31815
length of word embedding matrix 31815
after word to index for reviewText [0, 3656, 0, 16, 15, 120, 284, 208, 66, 892, 3656, 1582]
after word to index for summary [31814, 0, 3656, 73, 1177, 531, 31813]
total number of unk token are 0
length of dataset that will be used 90156
length of split datasets train 63109, test 13523 and validation 13524
Vocabulary Size: 31815
voc_to_int_ 31811 31812 31813

Categorical Plotting



total time to complete all the above steps and get final data 53.42056655883789
Model: "model"

```

-----
Layer (type)                Output Shape                Param #   Connected to
=====
-----
input_1 (InputLayer)        [(None, 80)]                0
-----

embedding (Embedding)        (None, 80, 300)            9544500   input_1[0][0]
-----

lstm (LSTM)                  [(None, 80, 80), (No 121920 embedding[0][0]
-----

input_2 (InputLayer)        [(None, None)]              0
-----

lstm_1 (LSTM)                [(None, 80, 80), (No 51520   lstm[0][0]
-----

embedding_1 (Embedding)      (None, None, 300)           9544500   input_2[0][0]
-----

lstm_2 (LSTM)                [(None, 80, 80), (No 51520   lstm_1[0][0]
-----

lstm_3 (LSTM)                [(None, None, 80), ( 121920
embedding_1[0][0]
lstm_2[0][1]
lstm_2[0][2]
-----

attention_layer (AttentionLayer ((None, None, 80), ( 12880   lstm_2[0][0]
lstm_3[0][0]
-----

concat_layer (Concatenate)    (None, None, 160)           0          lstm_3[0][0]
attention_layer[0][0]
-----

time_distributed (TimeDistribut (None, None, 31815) 5122215
concat_layer[0][0]
=====
=====
Total params: 24,570,975
Trainable params: 5,481,975
Non-trainable params: 19,089,000
-----
-----

```

Epoch 1/100
124/124 [=====] - 692s 5s/step - loss: 4.8655 - accuracy: 0.5186 - val_loss: 2.5352 - val_accuracy: 0.6424

Epoch 2/100
124/124 [=====] - 673s 5s/step - loss: 2.4703 - accuracy: 0.6448 - val_loss: 2.4478 - val_accuracy: 0.6425

Epoch 3/100
124/124 [=====] - 670s 5s/step - loss: 2.3868 - accuracy: 0.6456 - val_loss: 2.3862 - val_accuracy: 0.6441

Epoch 4/100
124/124 [=====] - 668s 5s/step - loss: 2.3137 - accuracy: 0.6475 - val_loss: 2.3129 - val_accuracy: 0.6495

Epoch 5/100
124/124 [=====] - 673s 5s/step - loss: 2.2441 - accuracy: 0.6521 - val_loss: 2.2444 - val_accuracy: 0.6550

Epoch 6/100
124/124 [=====] - 665s 5s/step - loss: 2.1759 - accuracy: 0.6562 - val_loss: 2.1882 - val_accuracy: 0.6573

Epoch 7/100
124/124 [=====] - 678s 5s/step - loss: 2.1220 - accuracy: 0.6592 - val_loss: 2.1439 - val_accuracy: 0.6618

Epoch 8/100
124/124 [=====] - 672s 5s/step - loss: 2.0641 - accuracy: 0.6639 - val_loss: 2.1113 - val_accuracy: 0.6629

Epoch 9/100
124/124 [=====] - 672s 5s/step - loss: 2.0386 - accuracy: 0.6648 - val_loss: 2.0768 - val_accuracy: 0.6667

Epoch 10/100
124/124 [=====] - 675s 5s/step - loss: 2.0062 - accuracy: 0.6683 - val_loss: 2.0571 - val_accuracy: 0.6677

Epoch 11/100
124/124 [=====] - 673s 5s/step - loss: 1.9745 - accuracy: 0.6698 - val_loss: 2.0340 - val_accuracy: 0.6703

Epoch 12/100
124/124 [=====] - 674s 5s/step - loss: 1.9461 - accuracy: 0.6726 - val_loss: 2.0134 - val_accuracy: 0.6722

Epoch 13/100
124/124 [=====] - 665s 5s/step - loss: 1.9302 - accuracy: 0.6727 - val_loss: 2.0027 - val_accuracy: 0.6724

Epoch 14/100
124/124 [=====] - 665s 5s/step - loss: 1.9235 - accuracy: 0.6727 - val_loss: 1.9889 - val_accuracy: 0.6739

Epoch 15/100
124/124 [=====] - 678s 5s/step - loss: 1.8857 - accuracy: 0.6766 - val_loss: 1.9737 - val_accuracy: 0.6757

Epoch 16/100
124/124 [=====] - 669s 5s/step - loss: 1.8670 - accuracy: 0.6773 - val_loss: 1.9595 - val_accuracy: 0.6767

Epoch 17/100
124/124 [=====] - 671s 5s/step - loss: 1.8546 -
accuracy: 0.6787 - val_loss: 1.9470 - val_accuracy: 0.6774

Epoch 18/100
124/124 [=====] - 674s 5s/step - loss: 1.8399 -
accuracy: 0.6798 - val_loss: 1.9381 - val_accuracy: 0.6787

Epoch 19/100
124/124 [=====] - 670s 5s/step - loss: 1.8319 -
accuracy: 0.6798 - val_loss: 1.9317 - val_accuracy: 0.6785

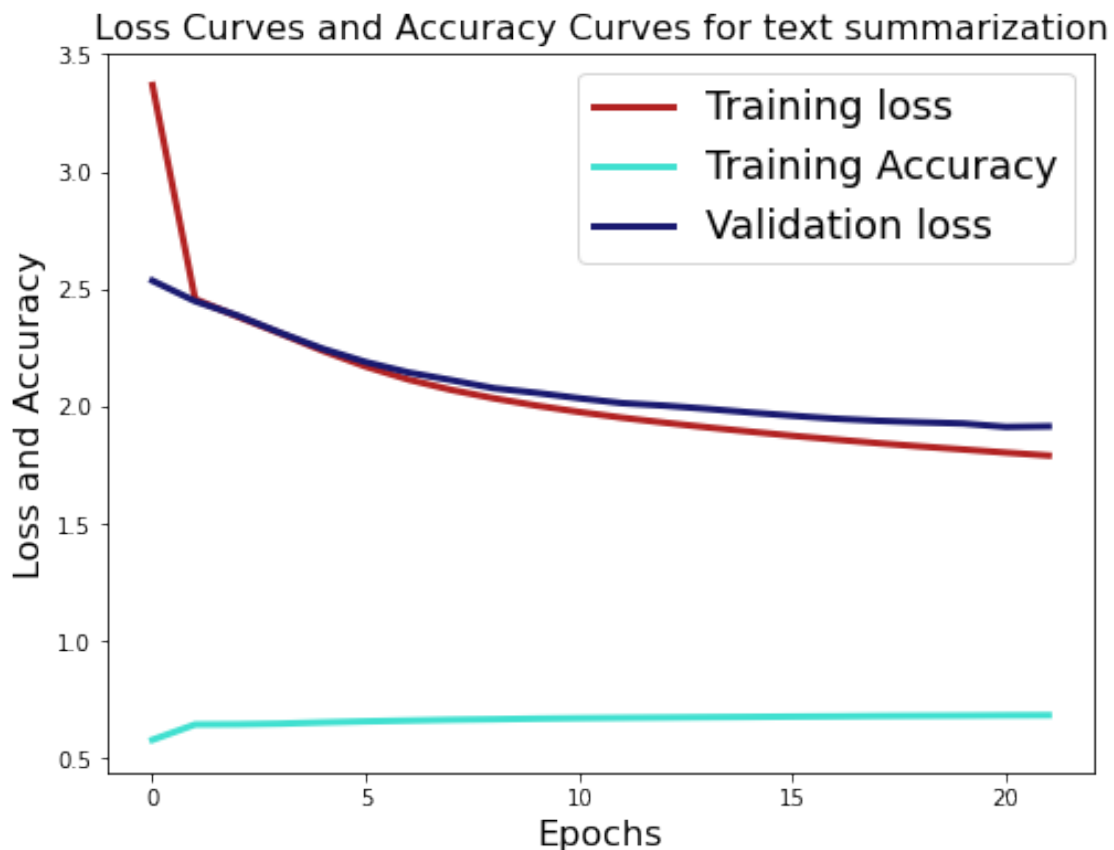
Epoch 20/100
124/124 [=====] - 673s 5s/step - loss: 1.8041 -
accuracy: 0.6827 - val_loss: 1.9266 - val_accuracy: 0.6797

Epoch 21/100
124/124 [=====] - 666s 5s/step - loss: 1.8014 -
accuracy: 0.6820 - val_loss: 1.9119 - val_accuracy: 0.6808

Epoch 22/100
124/124 [=====] - 667s 5s/step - loss: 1.7837 -
accuracy: 0.6837 - val_loss: 1.9146 - val_accuracy: 0.6800

Epoch 00022: early stopping
total time required for training 14784.443901538849
Review: arrived time like awesome bra gym material usually wear 36d ordered size
received 38dd large true size looks like fit 38dd comfortably update receive
correct size
Original Summary: too large
Predicted Summary: great bra
Review: breast cancer surgery needed bra soft rub glad especially like getting
soft taupe change pace
Original Summary: comfortable value
Predicted Summary: great bra
Review: begin convey love jeans tiny waist big ol butt thunder thighs trying
jeans generally exercise crushing sense self esteem clothing cut women
exaggerated form feminine shape makes worse jeans saving grace fit cut jeans fit
waist butt thighs best contemporary cut mom jeans
Original Summary: the only cut of jeans i wear
Predicted Summary: not what i expected
Review: <UNK> lightweight easy wear garment unfortunately gave good idea feel
like boa <UNK> wrapped mid section
Original Summary: more like a girdle
Predicted Summary: great
Review: brilliantly shiny love way bands fit good size large stone makes
believable diamond thing liked large stone set higher prongs good thing way set
snag things highly recommend ring set
Original Summary: looks and feels like real diamonds
Predicted Summary: beautiful
Review: lots pockets straps days making lifetime warranty attractive
Original Summary: and a lifetime warranty yes please
Predicted Summary: great bag
Review: love colors silk nice like size 9 1 2 x 9 1 2 small buy stay suit pocket

like <UNK> ones wearing pocket squares 20 years
Original Summary: pocket squares
Predicted Summary: nice shirt
Review: shirt turned better hoped soft black gray color material feels like soft leathery version polyester feels nice skin reason hubby shirt weekend dinners together comfy like shirt looks nice button
Original Summary: my husband loves this shirt
Predicted Summary: good quality
Review: received broken hole brand new shirt affect looking
Original Summary: broken hole
Predicted Summary: good quality
total time to complete 9315.99228978157
bleu, precisions, bp, ratio, translation_length, reference_length (0.0, [0.29223305752561074, 0.0, 0.0, 0.0], 1.0, 18.01730385269541, 243648, 13523)
rouge2 (0.018833942036287757, 0.820627802690583, 0.00952628839146278)
rouge {'rouge_1/f_score': 0.353127079314252, 'rouge_1/r_score': 0.33966061935632297, 'rouge_1/p_score': 0.41036276819387074, 'rouge_2/f_score': 0.28314670231537525, 'rouge_2/r_score': 0.31958383072226154, 'rouge_2/p_score': 0.2763949778683935, 'rouge_l/f_score': 0.6119362909252948, 'rouge_l/r_score': 0.657714106126071, 'rouge_l/p_score': 0.5815943207868076}
total time required for completing whole process 24162.707884311676



```
[ ]: #summary using T5small pretrained model
```

```
[ ]: #step26
#function is used to return the loss
def step(inputs_ids, attention_mask, y, pad_token_id, model):
    y_ids = y[:, :-1].contiguous()
    lm_labels = y[:, 1:].clone()
    lm_labels[y[:, 1:] == pad_token_id] = -100
    output = model(inputs_ids, attention_mask=attention_mask,
    ↪decoder_input_ids=y_ids, lm_labels=lm_labels)
    # loss
    return output[0]
```

```
[ ]: #step25
#this function is used to train the pretrained t5small model
def t5train(train_loader, val_loader, pad_token_id, model, EPOCHS, log_interval):
    #initialize empty list for train_loss and val_loss
    train_loss = []
    val_loss = []
    #optimizer
    optimizer = torch.optim.Adam(model.parameters(), lr=1e-4, weight_decay=1e-4/25)
    #iterate for number of epochs
    for epoch in range(EPOCHS):
        model.train()
        #start time
        start_time = time.time()
        #for data in train_loader train the model
        for i, (inputs_ids, attention_mask, y) in enumerate(train_loader):
            inputs_ids = inputs_ids.to(device)
            attention_mask = attention_mask.to(device)
            y = y.to(device)

            optimizer.zero_grad()
            loss = step(inputs_ids, attention_mask, y, pad_token_id, model)
            train_loss.append(loss.item())
            loss.backward()
            torch.nn.utils.clip_grad_norm_(model.parameters(), 0.5)
            optimizer.step()

        if (i + 1) % log_interval == 0:
            with torch.no_grad():
                x, x_mask, y = next(iter(val_loader))
                x = x.to(device)
                x_mask = x_mask.to(device)
                y = y.to(device)
```

```

v_loss = step(x, x_mask, y, pad_token_id, model)
v_loss = v_loss.item()

elapsed = time.time() - start_time
print('| epoch {:3d} | [{:5d}/{:5d}] | '
      'ms/batch {:5.2f} | '
      'loss {:5.2f} | val loss {:5.2f}'.format(
          epoch, i, len(train_loader),
          elapsed * 1000 / log_interval,
          loss.item(), v_loss))
start_time = time.time()
val_loss.append(v_loss)

return model

```

```

[ ]: #step26
#function to test the model it writes original and predicted summary in txt file
def testT5(model,tokenizer,test_loader):
    #intialize the empty lists
    predictions = []
    real_og=[]
    pred_op=[]
    #for data in test loader
    for i, (input_ids, attention_mask, y) in enumerate(test_loader):
        input_ids = input_ids.to(device)
        attention_mask = attention_mask.to(device)
        y = y.to(device)
        #generate summaries
        #store real and predicted summary in a list and write in txt file
        summaries = model.generate(input_ids=input_ids,
        ↪attention_mask=attention_mask,max_length=10)
        pred = [tokenizer.decode(g, skip_special_tokens=True,
        ↪clean_up_tokenization_spaces=False) for g in summaries]
        real = [tokenizer.decode(g, skip_special_tokens=True,
        ↪clean_up_tokenization_spaces=False) for g in y]
        for pred_sent, real_sent in zip(pred, real):
            print("Original: {}".format(real_sent))
            print("Predicted: {}".format(pred_sent))
            print("\n")
            real_og.append(real_sent)
            pred_op.append(pred_sent)
            predictions.append(str("pred sentence: " + pred_sent + "\t\t real_
            ↪sentence: " + real_sent+"\n"))

    file1 = open("/content/drive/MyDrive/TFIVE.txt","w")
    file1.writelines(predictions)

```

```

file1.close()
#calculate scores
bleau=compute_bleu(real_op,pred_op, max_order=4,smooth=False)
rougen=rouge_n(pred_op, real_op, n=2)
ro=rouge(pred_op, real_op)

print("bleu, precisions, bp, ratio, translation_length,↵
↪reference_length",bleau)
print("rouge2",rougen)
print("rouge",ro)

```

```

[ ]: #step27
#function to get the data and call all the functions in a sequence
def tf5token():
    class MyDataset(torch.utils.data.Dataset):
        def __init__(self, articles, highlights):
            self.x = articles
            self.y = highlights

        def __getitem__(self,index):
            x = tokenizer.encode_plus(model.config.prefix + str(self.x[index]),↵
↪max_length=200, return_tensors="pt", pad_to_max_length=True)
            y = tokenizer.encode(str(self.y[index]), max_length=10,↵
↪return_tensors="pt", pad_to_max_length=True)
            return x['input_ids'].view(-1), x['attention_mask'].view(-1), y.view(-1)

        def __len__(self):
            return len(self.x)

    #get the data
    x_tr,y_tr,x_tt,y_tt,x_val,y_val=combining_all_steps_t5()
    BATCH_SIZE = 128
    SHUFFEL_SIZE = 1024
    EPOCHS = 10
    log_interval = 200
    #get the pretrained model t5-small
    tokenizer = T5Tokenizer.from_pretrained('t5-small')
    model = T5ForConditionalGeneration.from_pretrained('t5-small').to(device)

    task_specific_params = model.config.task_specific_params
    if task_specific_params is not None:
        model.config.update(task_specific_params.get("summarization", {}))

    #create train,test and validation datasets
    train_ds = MyDataset(x_tr["reviewText"],y_tr["summary"])
    val_ds = MyDataset(x_val["reviewText"],y_val["summary"])
    test_ds = MyDataset(x_tt["reviewText"],y_tt["summary"])

```

```

train_loader = torch.utils.data.DataLoader(train_ds, batch_size=BATCH_SIZE)
val_loader = torch.utils.data.DataLoader(val_ds, batch_size=BATCH_SIZE)
test_loader = torch.utils.data.DataLoader(test_ds, batch_size=BATCH_SIZE)

x, x_mask, y = next(iter(val_loader))
print(x.shape, x_mask.shape, y.shape)
pad_token_id = tokenizer.pad_token_id

#call the train function
model=t5train(train_loader,val_loader,pad_token_id,model,EPOCHS,log_interval)
#call the test function
testT5(model,tokenizer,test_loader)

```

```
[ ]: tf5token()
```

Streaming output truncated to the last 5000 lines.

Original: my favorite pants
 Predicted: i love these

Original: great everyday gym bag
 Predicted: good bag for gym

Original: too small
 Predicted: i thought it

Original: good skivvies
 Predicted: tucks

Original: purple cactu basketball shoes
 Predicted: i love these

Original: boooooo not like they used to be
 Predicted: t shirts

Original: pleasantly surprised
 Predicted: katarin

Original: gift purchase

Predicted: my sister loved these

Original: awesome summer suns

Predicted: ray ban

Original: score one for the boyfriend

Predicted: i love these

Original: good buy

Predicted: for a good

Original: built like a tank wont break the bank

Predicted: it has it is

Original: slight changes in manufacture and still and excellent product

Predicted: slight change in texture

Original: love these shoes

Predicted: i love these

Original: this is my favorite purse

Predicted: a great purse

Original: best crew socks

Predicted: i love these

Original: back pack

Predicted: sexy

Original: thick soft good quality

Predicted: socks are a

Original: good value

Predicted: iwth

Original: hard to find shoes

Predicted: great price for the

Original: wears out quickly

Predicted: i do not

Original: i love them

Predicted: i like them

Original: great idea

Predicted: i love these

Original: good quality tee but the material

Predicted: tee

Original: cute and comfy

Predicted: shoes look nicer

Original: functional but not ornate

Predicted: a mask for

Original: fits skinny not tight

Predicted: leotard

Original: bogs are the best

Predicted: i love these

Original: will buy again

Predicted: hubby s

Original: bad buckle

Predicted: flip backwards

Original: not that great

Predicted: i like it

Original: expensive but good

Predicted: makes a great

Original: decent

Predicted: a little expensive

Original: really nice shoes comfortable great fit

Predicted: i quit buying

Original: great toy

Predicted: great toy for

Original: nice clog

Predicted: clogs

Original: nice but not as nice as the prior generation

Predicted: i like it

Original: wigwam men s at wort

Predicted: good socks for work

Original: cute design does not pinch chubby

Predicted: iplays

Original: comfy tight

Predicted: airy feet are

Original: great watch for kids or even adults beautiful feminine watch

Predicted: a great watch

Original: fine product

Predicted: dowdy

Original: beautiful necklace

Predicted: i love it

Original: love them

Predicted: asics

Original: little narrow

Predicted: a little narrow

Original: carhartt is just good stuff

Predicted: carhartt coat

Original: normal

Predicted: a little bulk

Original: good product

Predicted: i liked it

Original: cotton polo standard issues

Predicted: a pol

Original: i love it

Predicted: the right fit and

Original: good buy

Predicted: sexy

Original: love these sandals

Predicted: fettish fit

Original: great fit

Predicted: a gift for

Original: handy little lock

Predicted: heavy cable threads

Original: great except for the leather strap

Predicted: watch for the price

Original: comfy keen

Predicted: keen sa

Original: the hood cant be removed or put in
Predicted: the hood is

Original: work well easy to use
Predicted: crouching

Original: booty shorts
Predicted: sexy

Original: birkenstocks last
Predicted: birks

Original: probably of good quality but too small for daily use
Predicted: i liked it

Original: good value spring jacket
Predicted: nice jacket for the

Original: perfect for blocking sun and keeping dirt off
Predicted: i like it

Original: love
Predicted: i love these

Original: they look good
Predicted: the best belt

Original: great pair of working pant
Predicted: dickies

Original: beautiful and match everything
Predicted: i love these

Original: pretty cool shorts

Predicted: sucks

Original: awesome

Predicted: scotl

Original: love

Predicted: love these house slip

Original: beautiful but size up

Predicted: i love this

Original: great price for a really classy shoe

Predicted: i love these

Original: a bit big

Predicted: a bit big

Original: can also be used as swimming trunks

Predicted: a bit tight

Original: playtime

Predicted: wigs are

Original: see it from both ways

Predicted: i love it

Original: what a comfortable and attractive shoe

Predicted: easy to get compliment

Original: great gift to self

Predicted: sexy

Original: warm pants nice and warm

Predicted: stepdads are

Original: great for display and fun

Predicted: i love this

Original: definitely a convert

Predicted: i am not

Original: recommend it

Predicted: i like the

Original: disapointed

Predicted: a great watch

Original: bermuda

Predicted: great travells

Original: nice belt for the money

Predicted: good quality belt for

Original: these are my favorites

Predicted: v panties

Original: very comfortable with good support

Predicted: i like it

Original: style for my little guy

Predicted: sexy

Original: well worth it

Predicted: i love these

Original: love

Predicted: i love it

Original: perfect

Predicted: comfortable and light weight

Original: iacute tem purchased as expected

Predicted: i love it

Original: wow

Predicted: i love it

Original: absolutly beautiful i love it

Predicted: ring for the

Original: the arch support the arch support the arch support

Predicted: crocs

Original: why pay full price

Predicted: kohl is the

Original: beautiful watch

Predicted: i love it

Original: lovely

Predicted: i love this

Original: great costume

Predicted: a great costume

Original: ellegant

Predicted: buy this item for

Original: too small

Predicted: great bagga

Original: my baby

Predicted: i love this

Original: love it

Predicted: good quality and quality

Original: comfortable

Predicted: sneaker is great

Original: excellent bought two
Predicted: i do not

Original: not enough arch support
Predicted: the arches are

Original: real cool
Predicted: it has it is

Original: fits great
Predicted: 2 suits are great

Original: like em but not very comfy
Predicted: i love these

Original: love it
Predicted: i love this

Original: good walking shoe
Predicted: nb

Original: so adorable
Predicted: my granddaughter loves these

Original: good undershirts
Predicted: i love these

Original: impressive unique watch
Predicted: nut watch for

Original: disapointed
Predicted: i like them

Original: best i have tried

Predicted: i love these

Original: batgirl

Predicted: costume for my daughter

Original: pretty yellow jacket

Predicted: i like it

Original: cute

Predicted: cute hat but

Original: nice boots

Predicted: i love this

Original: love the sandal

Predicted: sizing is

Original: looks good too but easy to scratch

Predicted: watch for the price

Original: muy buenos

Predicted: muy bue

Original: true to its size

Predicted: size is a

Original: christmas gift

Predicted: gift for cowork

Original: best sports watch i have had

Predicted: watch for a

Original: brightness by the sun

Predicted: man s watch

Original: typical gold toe quality

Predicted: socks

Original: night night

Predicted: lite silky

Original: he said i needed it

Predicted: rich steve

Original: size runs large for an asian guy

Predicted: i ordered small

Original: run large

Predicted: shoes ran a

Original: converse converse chuck tay

Predicted: his son is happy

Original: ok

Predicted: comodas

Original: nike slides for my granddaughter

Predicted: fpor

Original: crocs but different

Predicted: crocs

Original: excellent

Predicted: flip flops

Original: hat not like photo

Predicted: good looking hat

Original: toe socks he squealed

Predicted: squea

Original: cozy

Predicted: i love these

Original: cleverly done

Predicted: neice

Original: polyu watch

Predicted: plastic watch crystals

Original: nice boot good price

Predicted: good for the price

Original: too gawdy

Predicted: the picture is

Original: great

Predicted: i love it

Original: runs large

Predicted: flats run small

Original: surprisingly comfortable and beautiful color

Predicted: i am not

Original: rjm

Predicted: compression is too small

Original: perfect pants

Predicted: i love these

Original: correct size means good fit

Predicted: i love this

Original: nice

Predicted: shopper

Original: sketchers are dependable

Predicted: sketchers shoes are

Original: i love it
Predicted: love the size and

Original: three stars
Predicted: the pins break

Original: runs small
Predicted: bust runs small

Original: way too tight
Predicted: a little

Original: breakfast at tiffany s
Predicted: tiffany

Original: belt
Predicted: cwc

Original: have been using it for a long time
Predicted: i did not

Original: just what i wanted
Predicted: roaring 20

Original: elegant crystal ring dish
Predicted: ring holders are

Original: exactly as shown
Predicted: the ring looks

Original: my wife s is incredible for the price
Predicted: i bought this

Original: great fit

Predicted: a bit tight

Original: watch did not last a long time
Predicted: lasted a

Original: red gloves for christmas
Predicted: a gift for

Original: great clasps
Predicted: earrings

Original: playtex front close bra
Predicted: 84 year old

Original: comfy and firm
Predicted: i love it

Original: fantastic lasted years
Predicted: one size fits all

Original: my secret
Predicted: easy to find and

Original: cute
Predicted: i guess it

Original: a keeper i would buy more
Predicted: good bra for the

Original: vry narrow and flimsy
Predicted: flims

Original: nice sunglasses but a bit small
Predicted: ray bans

Original: just great

Predicted: i like these

Original: too close fitting

Predicted: work camisole

Original: great shoes

Predicted: sizing down

Original: if i had gotten a packing

Predicted: packing slips are

Original: love it

Predicted: i bought this

Original: excellent for travel

Predicted: perfect for a

Original: nice watch

Predicted: i love this

Original: very nice and comfortable

Predicted: sling shoes

Original: great quality

Predicted: i love it

Original: good shoe

Predicted: husband loves these shoes

Original: the sizes are terribly inaccurate

Predicted: sock is

Original: very good

Predicted: sun glasses for kid

Original: comfy flip flops

Predicted: havaiana

Original: fine product not for passport
Predicted: i like the

Original: very pretty
Predicted: sexy

Original: comfortable fabulous
Predicted: for 40dd

Original: very nice first jewelry box
Predicted: a gift for

Original: only jockey for me from here on
Predicted: hanes underwear

Original: nice shirt
Predicted: junior polo

Original: lighter than it looks
Predicted: a little big

Original: solid product
Predicted: pricey crystal crystal

Original: great extended size socks
Predicted: i love these

Original: fits and looks nice
Predicted: a little small

Original: size on the box reflects true size of socks
Predicted: great socks great material

Original: beautiful

Predicted: ring is big

Original: this bra is amazing

Predicted: ordered a size

Original: a nice sturdy pair of britches

Predicted: pair of bri

Original: nice and worm

Predicted: pair of socks for

Original: reebok easytone

Predicted: easytones are

Original: love them

Predicted: tao

Original: i love it

Predicted: ggifts

Original: shawl

Predicted: sexy

Original: i will buy again

Predicted: large runs small but

Original: seems big and straps are far too wide

Predicted: a little big

Original: way too small

Predicted: crotch

Original: definitely worth it

Predicted: i wear these

Original: size up

Predicted: the strap is screw

Original: expensive but worth it

Predicted: soooo expensive

Original: leopard gloves

Predicted: bkack

Original: gorgeous earrings

Predicted: omg

Original: comfort comfort comfort

Predicted: i am not

Original: good shoe

Predicted: the leather gets dirty

Original: adorable shoes

Predicted: sexy

Original: ugh beautiful

Predicted: winter boot i

Original: too hard and too large

Predicted: sizing is

Original: winner

Predicted: kohls

Original: nice

Predicted: old style robe

Original: cant go wrong with ariat

Predicted: ariat rope

Original: daughter loves them as always you pay for

Predicted: my daughter loves them

Original: great shoe
Predicted: i love them

Original: great fit
Predicted: hunch

Original: comfortable
Predicted: i like it

Original: good stuff
Predicted: the 3rd

Original: not well fitted on top
Predicted: i like the

Original: i love this scrub top
Predicted: the best scrubs

Original: might be switching my brand
Predicted: levi s

Original: fantastic
Predicted: i lost my

Original: what has what is up with the tag thing on
Predicted: i was surprised

Original: great fit sock
Predicted: enjop

Original: anklets for every day
Predicted: nike

Original: good value

Predicted: armitron watch

Original: just what i needed

Predicted: i love this

Original: this does exactly what it says i use this

Predicted: i am

Original: they are great

Predicted: i was

Original: get what you pay for

Predicted: i like the

Original: granddaughter gives two thumbs up

Predicted: sexy

Original: sold my soul to the devil

Predicted: i love it

Original: love it

Predicted: the best timex

Original: just cool

Predicted: a great watch

Original: shrunk too short

Predicted: russell x

Original: timex kids lizard watch

Predicted: a great watch

Original: dainty circles

Predicted: smallish earrings da

Original: review was wrong

Predicted: i do not

Original: i shall i will beat this one up

Predicted: great watch for the

Original: the ultimate in cool

Predicted: ray ban

Original: keep your expectations high girls

Predicted: a plus size

Original: love them

Predicted: i love these

Original: timex watch

Predicted: a great watch

Original: works boot cut jeans

Predicted: long lasting levi

Original: great purchase

Predicted: w 6 4

Original: very cute wedge

Predicted: striking wedge sandals

Original: cute

Predicted: i love these

Original: perfect gift

Predicted: great gift for my

Original: great gift idea

Predicted: a great gift

Original: i love love love love it

Predicted: boobs

Original: quality matches the cheap price
Predicted: cheap for the price

Original: good
Predicted: i like the

Original: inexpensive but really great
Predicted: it works great for

Original: comfortable attractive reasonably supportive for smaller sizes
Predicted: i love it

Original: durable but not skid proof
Predicted: shoe i liked

Original: oh thank goodness
Predicted: love these slippers

Original: nice wallet soft leather
Predicted: the wallet is

Original: the basic cube indispensable
Predicted: eagle

Original: love them
Predicted: i love these

Original: not soft
Predicted: a little disappointed

Original: comfortable cool sandal
Predicted: i love these

Original: no support not very cushiony

Predicted: slippers are great

Original: love them

Predicted: i wear these

Original: needed for swollen feet

Predicted: sizing is

Original: so so

Predicted: i love these

Original: uniboob

Predicted: boob support

Original: excellent watch only missing one thing

Predicted: i love this

Original: nice little travel bag

Predicted: leather travel bag great

Original: pretty good

Predicted: a little loose

Original: rain poncho

Predicted: great for travel but

Original: butterfly necklace

Predicted: my granddaughter loves it

Original: good bra

Predicted: good for larger chest

Original: love them

Predicted: pair i have

Original: great socks

Predicted: good fit good price

Original: great costume

Predicted: i love it

Original: love em

Predicted: t shirts

Original: cuter in person

Predicted: i love them

Original: better but not great

Predicted: men s under

Original: good quality

Predicted: a good shoe

Original: cool

Predicted: crooked

Original: love the quality of levis jeans and its very

Predicted: i love le

Original: disappointed

Predicted: i love these

Original: 14 long just barely

Predicted: 5 10 34 long

Original: thick comfy

Predicted: i love these

Original: still working

Predicted: ben winder

Original: best jeans i have ever come acrossed

Predicted: wrangler

Original: perfect

Predicted: sizing is

Original: love love

Predicted: i love these

Original: george gge

Predicted: the wife loves them

Original: great belt buckle at a great price

Predicted: i love it

Original: butterfly necklace

Predicted: i love this

Original: great pants

Predicted: good quality pants for

Original: perfect

Predicted: i love these

Original: great quality runs a little small

Predicted: i love this

Original: really thin material

Predicted: a must have

Original: happy feet

Predicted: i love these

Original: after 1 use it has paid for itself

Predicted: i like it

Original: platinum for sure

Predicted: a nice watch

Original: good

Predicted: i got it

Original: great fit

Predicted: sexy

Original: pretty but not structured well

Predicted: i love this

Original: jockey always makes the men happy

Predicted: men s joc

Original: great pouch

Predicted: loose 22lr

Original: nice

Predicted: a great watch

Original: the waistband rolls down

Predicted: my waistband runs

Original: pretty and perfect

Predicted: bridesmaid

Original: perfect

Predicted: clingy

Original: perfect size hoop

Predicted: oversized oversized

Original: high quality loose fit and i love the pocket

Predicted: new favorite brand of

Original: crunchy dress

Predicted: i did not

Original: great bang for the buck
Predicted: 8926a

Original: feel good
Predicted: recieve

Original: sizing is just bad these boots are just
Predicted: merrell bate

Original: good fit nice material
Predicted: i love it

Original: horrible stitching in the neck band
Predicted: overly picky

Original: sorel men s caribou buff
Predicted: i love them

Original: belt
Predicted: good quality leather weave

Original: great value
Predicted: i ordered

Original: best bra for now
Predicted: i love play

Original: nice
Predicted: a nice addition

Original: backpackers watch
Predicted: a great watch

Original: wonderful strap nice dial and number stand out

Predicted: i love this

Original: as expected
Predicted: a bit tight

Original: great
Predicted: i love this

Original: very small
Predicted: dantee

Original: love these
Predicted: i wear it

Original: two small
Predicted: i like it

Original: soft comfy very lightweight
Predicted: easy spirit s

Original: pointy
Predicted: large breasted

Original: 5 stars for great socks to work out in
Predicted: i love these

Original: good fabric
Predicted: nice shirt but not

Original: exactly as i had hoped
Predicted: i wish

Original: good so times two
Predicted: i love these

Original: wow is it durable

Predicted: a good watch

Original: great robe

Predicted: 6ft 3

Original: atlanta georgia 17 y

Predicted: i love this

Original: huge

Predicted: skinny husband s

Original: wonderful shirts

Predicted: i love it

Original: big and light but broke pretty quickly

Predicted: i love my

Original: comfy warm and dry

Predicted: i love it

Original: limousine s for your feet

Predicted: i love this

Original: very nice necklace

Predicted: i love it

Original: ok

Predicted: ok but not

Original: these tights nicely complete my granddaughter s costumes

Predicted: navy tights are

Original: love love love this underwear

Predicted: feel like body breathing

Original: its ok but i dont think these are

Predicted: hanes shirts

Original: just fine

Predicted: nice fit good quality

Original: i am a kid again

Predicted: geezer jeans

Original: nice

Predicted: the color fades

Original: 10k yellow gold and diamond three stone heart pendant

Predicted: i like the

Original: move over uggs

Predicted: ugg slipper

Original: fleur de lis earrings

Predicted: cleversilver

Original: minnetonka sandal

Predicted: a little wide

Original: good work jeans

Predicted: wrangler

Original: nylons

Predicted: i love it

Original: great quality

Predicted: canadian girl

Original: fitflops are the best

Predicted: i love fit

Original: a gown husbands will love

Predicted: love love it but

Original: it has it is carhartt

Predicted: the carhartt

Original: love these pants

Predicted: great pants for the

Original: returned reefs bought these

Predicted: fav

Original: try to optimize on the packaging

Predicted: stuffed weighty

Original: good for a few uses

Predicted: a good pair

Original: not for me

Predicted: nursing nursing bras

Original: great

Predicted: i loved these

Original: shapewear

Predicted: i love this

Original: i love the shape ups

Predicted: arthritis

Original: big tall

Predicted: t shirts

Original: great socks

Predicted: ua is

Original: cute fashion look

Predicted: i wear these

Original: waste

Predicted: a lot stiff

Original: good solid belt

Predicted: feels like a

Original: stays put

Predicted: true to size but

Original: great

Predicted: i wish

Original: fit

Predicted: fit flops

Original: very cushy

Predicted: i like it

Original: not bad for the money but not my first choice

Predicted: not as bright as

Original: love these things

Predicted: makes packing easy to

Original: fits well

Predicted: i love it

Original: beautiful ties at the right price

Predicted: fiance loves these

Original: could not be better

Predicted: a little small

Original: fits exactly

Predicted: i like it

Original: beautiful necklace

Predicted: beautiful earrings for the

Original: comfortable good lookin too

Predicted: i love these

Original: perfect

Predicted: i loved it

Original: classy versitile comfortable

Predicted: toffee sandal

Original: classy and beautiful

Predicted: i love this

Original: perfect

Predicted: easy clean and sturdy

Original: tight around calves

Predicted: a little tight

Original: love these

Predicted: i love them

Original: comfy but small

Predicted: a little small

Original: great bra

Predicted: i love this

Original: so far so good

Predicted: laces are great

Original: not the size i wanted but this product is

Predicted: the shapers

Original: gorgeous

Predicted: the chain looks pretty

Original: great watch but

Predicted: a great watch

Original: great product

Predicted: i love it

Original: son loves it

Predicted: great product for college

Original: nope

Predicted: i love them

Original: five stars

Predicted: great lab coat fabric

Original: silver twisted hoop earrings

Predicted: the earring

Original: great sandal

Predicted: electra elect

Original: very good

Predicted: a casi

Original: casio wow

Predicted: g shock men

Original: comfortable and infinitely usable

Predicted: a great hiking

Original: great watch

Predicted: wal mart

Original: durable and good looking
Predicted: carhartt

Original: disappointed with this product
Predicted: sprayed shoes

Original: my gf love it
Predicted: kinda chunky

Original: good product
Predicted: great for hiking hiking

Original: beautiful dress
Predicted: i love this

Original: really nice
Predicted: dries quickly

Original: i love the lord
Predicted: lord

Original: good quality great fit and comfortable
Predicted: sandels

Original: good undergarment
Predicted: i needed

Original: lost immediately
Predicted: the lever backs

Original: carhartt washed duck dungare
Predicted: a canvas pan

Original: very cute

Predicted: i love it

Original: stand in

Predicted: ring i

Original: too small for purpose

Predicted: i ordered it

Original: perfect

Predicted: i love this

Original: fruit of the loom brand

Predicted: ok but not

Original: great for summer

Predicted: women s swim

Original: good

Predicted: hwo

Original: pretty great

Predicted: a little small

Original: experience with nb socks

Predicted: nb socks

Original: ugh

Predicted: thigh high

Original: heavy duty belt

Predicted: heavy heavy and massive

Original: very comfortable

Predicted: maternity bra for

Original: halloween costume

Predicted: flims

Original: sagging in the butt again

Predicted: levi s

Original: great belt heavy and durable

Predicted: scuff

Original: murano

Predicted: i love these

Original: one star

Predicted: tight to the face

Original: wonderful sun cover

Predicted: i like it

Original: runs small and long

Predicted: a little small

Original: good for a short time wear

Predicted: wig cap cap

Original: these do not leak and adjusts to altitude

Predicted: gotubes travel

Original: what a pleasant surprise

Predicted: beautiful mala beads

Original: great price

Predicted: i love these

Original: nice belt

Predicted: a great belt

Original: good push up

Predicted: the bra fits true

Original: looks good

Predicted: slack

Original: comfortable everyday shoes

Predicted: the toes

Original: very nice pants

Predicted: d3

Original: a good choice for the travel savvy at

Predicted: i originally purchased

Original: great

Predicted: good quality and good

Original: great luggage

Predicted: sams

Original: love these earrings

Predicted: a gift for

Original: exceptionally well made and comfortable

Predicted: good for a

Original: ran large

Predicted: sizing is

Original: am i really writing a review for box

Predicted: i love these

Original: would be cute if they fit

Predicted: sizing is

Original: great shorts with minor caveats

Predicted: like these shorts

Original: finally found the one

Predicted: sizing is

Original: i like them but

Predicted: black sock

Original: lover of jambu shoes is somewhat disappointed

Predicted: i wear these

Original: awesome backpack but does not fit a 15 6

Predicted: i love this

Original: nice flip flop

Predicted: flip flops

Original: do not get the white color

Predicted: it has it is

Original: no support

Predicted: i needed

Original: you get what you payed for it

Predicted: good watch for the

Original: good product

Predicted: a little small

Original: classic comfortable reefs

Predicted: i love these

Original: best birthday gift

Predicted: a gift for

Original: chef hat

Predicted: a gift for

Original: how do they work

Predicted: laces are

Original: lovely earrings

Predicted: beautiful earrings for my

Original: very nice sweater

Predicted: i wear it

Original: nice necklace

Predicted: el salva

Original: thrilled

Predicted: dora backpack

Original: very good work shoe

Predicted: i need to

Original: great watch tiny strap

Predicted: f91w

Original: comfortable well made shirt

Predicted: sizing is

Original: love these jeans

Predicted: i love these

Original: they fulfill their purpose

Predicted: hanes underwear

Original: glamorise bra

Predicted: i love it

Original: awesome jewelry case

Predicted: sceptical

Original: it has it is a beanie

Predicted: a little small

Original: i do adore this spectacular cheap jeans

Predicted: dlls

Original: scer178 earrings

Predicted: i love these

Original: great but no arch support

Predicted: i do not

Original: bali skimp skamp for men too

Predicted: i love these

Original: not worth of 30

Predicted: i love these

Original: has been a huge help for my heels

Predicted: i love these

Original: decent socks

Predicted: a little tight

Original: comfortable and quality

Predicted: jeans i love

Original: winter staple

Predicted: kids s

Original: perfect ballet

Predicted: lightweight and comfy but

Original: perfect

Predicted: wait for a

Original: awesome boxers
Predicted: pair of boxers

Original: very comfortable and supportive
Predicted: bra for larger gal

Original: so comfortable
Predicted: keds are

Original: they are ok
Predicted: i love it

Original: cute fun for a range of ages
Predicted: a kidd

Original: very comfortable nice material
Predicted: a great buy

Original: good
Predicted: a good slip

Original: disapointed
Predicted: shoe collapsed after

Original: stylish good color and fit
Predicted: if you are

Original: champion women s absolute workout knee tights
Predicted: small waisted

Original: interesting design
Predicted: i do not

Original: buy these

Predicted: tell friends tell them

Original: love it

Predicted: i love this

Original: really attractive

Predicted: i was surprised

Original: much better than outlets same price

Predicted: the quality of the

Original: slippery on wet tiles

Predicted: water shoe not for

Original: it has it is a winner

Predicted: a great watch

Original: just ordered my second pair

Predicted: i love these

Original: comfortable

Predicted: cold winter underwear

Original: very good

Predicted: if you live

Original: just right for what i needed

Predicted: a little small

Original: belt

Predicted: i love it

Original: awesome

Predicted: a great watch

Original: my baby thinks this is a s

Predicted: a little big

Original: very nice sleeveless shirts
Predicted: i ordered this

Original: amber beauty
Predicted: i like the

Original: just a great costume
Predicted: sexy

Original: seen it on tv
Predicted: tv

Original: not the right color
Predicted: i love these

Original: just right for me
Predicted: i love these

Original: comfortable and stylish
Predicted: i love it

Original: love this sexy dress
Predicted: 5 3 34

Original: skechers d lite
Predicted: i love them

Original: runs small
Predicted: jr is

Original: the ultimate in flip flops
Predicted: havaiana

Original: nice wallet

Predicted: good buys 10

Original: becoming a classic shoe around here
Predicted: crocs

Original: these are light and comfortable
Predicted: stretchy cami

Original: great
Predicted: sexy

Original: material is very thin
Predicted: i need

Original: very nice
Predicted: awesome

Original: stylish
Predicted: great pair of le

Original: five stars
Predicted: i love it

Original: lysse leggings
Predicted: tummy control

Original: i am very impressed serious engineering apparently went into
Predicted: i am impressed

Original: nice look
Predicted: a bit darker

Original: a must have for the messy traveller
Predicted: i love this

Original: love the material

Predicted: material looks like traditional

Original: more like sports bra

Predicted: like a sports

Original: durable materials

Predicted: packable bag for

Original: quick delivery

Predicted: i am allergic

Original: i mean haha

Predicted: i love it

Original: great boot i bought a second pair

Predicted: let me start saying

Original: perfect

Predicted: bella vita

Original: camo shirt

Predicted: great price great buy

Original: not great for a well endowed woman

Predicted: sexy

Original: it is not bad just not for me

Predicted: didnt like it

Original: just what expected

Predicted: i bought these

Original: run long

Predicted: long inse

Original: my favorite shirt

Predicted: t shirts

Original: great product via elite hero

Predicted: great propper for

Original: fits smaller than canuck maybe less clun

Predicted: a winter boot

Original: good propper quality as per usual

Predicted: i like the

Original: transformers arent always cool and cud

Predicted: i was

Original: poor quality

Predicted: loosely woven

Original: very durable

Predicted: i love this

Original: bad neighbor

Predicted: i mean

Original: does not keep the right day date face got

Predicted: a great watch

Original: fantastic jacket

Predicted: thecolumbi

Original: simple and elegant

Predicted: i love these

Original: 18k gold overlay sterling silver multi gemstone ring

Predicted: mult gemstone ring

Original: not super heavy duty carries bulky light stuff

Predicted: plastic clamps are

Original: most comfortable flip flops i have warn

Predicted: i love these

Original: great for big girls

Predicted: sexy

Original: gold toe quarter socks

Predicted: i have not

Original: beautiful shoe fits well and is very fashionable

Predicted: good quality shoe for

Original: colorful

Predicted: i love it

Original: love that their longer and fit loose

Predicted: new style shorts

Original: nautica watch n14538g

Predicted: nautica watch

Original: well made apron

Predicted: good quality a

Original: simply love them

Predicted: i love fit

Original: poor quality

Predicted: poor quality belt was

Original: on the small size

Predicted: a little bit

Original: adorable and durable

Predicted: i love these

Original: cheap price but great product

Predicted: i like the

Original: cute and colorfull

Predicted: i love it

Original: cute

Predicted: a cape

Original: lives up to description

Predicted: sizing is

Original: great sandal for all water activities

Predicted: i love these

Original: too small

Predicted: ring size is

Original: nice jeans

Predicted: i ordered these

Original: lumpy seams

Predicted: a little tight

Original: a little tight but absolutely stunning

Predicted: a bit tight

Original: d best

Predicted: i like it

Original: great bra

Predicted: i love this

Original: hanes waistband woven boxers

Predicted: hanes is my

Original: buy a bit bigger

Predicted: a little small

Original: great fit comfortable

Predicted: wrangler

Original: very comfortable

Predicted: i love these

Original: well made and should last for a good while

Predicted: levi s

Original: average

Predicted: i love it

Original: meets my expectations

Predicted: i love it

Original: like it

Predicted: i like it

Original: nothing like frye quality

Predicted: pair of boots that

Original: great for hiking boots

Predicted: i love these

Original: very comfortable

Predicted: t shirt

Original: very cute

Predicted: sexy

Original: worth it

Predicted: i love these

Original: simple but useful

Predicted: nike

Original: stylish

Predicted: narrow and small but

Original: great shirts

Predicted: i like the

Original: pretty thin

Predicted: like a pan

Original: great but i like the patra better

Predicted: crocs

Original: perfect

Predicted: a great tie

Original: perfect fit

Predicted: slender

Original: eh not impressed

Predicted: i ordered it

Original: nice case

Predicted: i like it

Original: great gift for my

Predicted: a great gift

Original: okay

Predicted: dockers crew socks

Original: a great scarf with a lot of uses

Predicted: shemaghs

Original: not ughs

Predicted: better value for the

Original: not pretty but functional

Predicted: happy with this bra

Original: very nice earrings

Predicted: i love these

Original: they changed it

Predicted: i love this

Original: bazinga

Predicted: i bought this

Original: love em have bought 5

Predicted: best undergarments

Original: no itch

Predicted: long john

Original: excellent watch at a exe

Predicted: watch for the price

Original: watch band

Predicted: i like this

Original: comfortable and stylish

Predicted: i love these

Original: it has it is ok

Predicted: flims

Original: lervi s for me

Predicted: i love it

Original: well balanced

Predicted: asics

Original: love it comfortable and light

Predicted: the base layer was

Original: great boots for winter weather

Predicted: a must have

Original: great detail

Predicted: bead fits

Original: nb mens mr1906

Predicted: nb10

Original: nan

Predicted: flims

Original: cannot go wrong

Predicted: i love these

Original: reasonably good quality but not what i was looking

Predicted: a little narrow

Original: so great got another

Predicted: the best sports bra

Original: great boots full size too big though

Predicted: sizing is

Original: economical

Predicted: a great buy

Original: schechers women s biker mar

Predicted: shoses

Original: surprised it did not cost more
Predicted: macho is

Original: omg my new fave
Predicted: i love these

Original: great quality
Predicted: gripes are

Original: ok but i would look for another bra
Predicted: good quality nursing bra

Original: very comfy
Predicted: i love these

Original: comfortable hat
Predicted: low profile hat

Original: good looking good fitting jacket
Predicted: a must have

Original: very comfortable flip flops
Predicted: flip flops

Original: longer than usual
Predicted: sizing is

Original: love at first wear followed with 4 yr
Predicted: teva

Original: hat
Predicted: i love it

Original: great color

Predicted: i love it

Original: if it has it is merrell it has
Predicted: merrell moa

Original: not as cute as expected
Predicted: shoe runs big color

Original: glasses have a slightly tight fit compared to
Predicted: jimart

Original: love these but too small
Predicted: ordered 3 based

Original: nice shirt
Predicted: t shirt for

Original: great luggage addition
Predicted: easy to use and

Original: came on time and fits fine
Predicted: i washe

Original: heavy duty
Predicted: i love these

Original: this was a gift
Predicted: a gift for

Original: drawstring comfort
Predicted: i liked it

Original: love the boots but they fit me big
Predicted: i am going

Original: great investment

Predicted: love the buxton

Original: sketchers from amazon
Predicted: i have worn

Original: great coveralls
Predicted: great coveralls

Original: best flip flops ever made
Predicted: flip flops

Original: comfortable enough to wear all day
Predicted: i love these

Original: i love these workout pants
Predicted: a little too

Original: very comfortable only slightly small for me
Predicted: sizing is

Original: not what i needed
Predicted: i love it

Original: love this nursing bra my favorite
Predicted: a nursing bra

Original: levi s are not like they used to
Predicted: pair of levi

Original: warning five loops not seven
Predicted: jeans with a

Original: love it love it
Predicted: i love it

Original: great for the money

Predicted: trainers work for

Original: scuffed

Predicted: ksw

Original: love it

Predicted: the ring ran

Original: prettier than pictured

Predicted: a little bit

Original: clear and rusty

Predicted: i love it

Original: simply the best

Predicted: the best bra ever

Original: colors are nice

Predicted: a little wide

Original: beautifully styled ring

Predicted: i love this

Original: awesome

Predicted: i love it

Original: great product

Predicted: the gate is not

Original: khaki s

Predicted: a little small

Original: pretty handkerchiefs

Predicted: handkerchiefs

Original: awesome

Predicted: i love it

Original: close but not quite

Predicted: clima

Original: excellent fit support and comfort

Predicted: i love these

Original: great work pants

Predicted: good quality and quality

Original: great

Predicted: carhart for the

Original: the only sports bra i wear

Predicted: the best sports bra

Original: terrific

Predicted: fiance loves these

Original: perfect gift for a young woman

Predicted: a gift for

Original: great gloves colors are vivid and quality is nice

Predicted: great for the price

Original: good but kinda roomy in the derrier

Predicted: i do not

Original: love my thigh highs

Predicted: thigh high

Original: beautiful rain boots

Predicted: i love them

Original: quality item at a reasonable price

Predicted: good value for the

Original: celtic design dangle earrings

Predicted: beautiful earrings i

Original: great liners 4 stars

Predicted: liners are great

Original: love it

Predicted: i love it

Original: ginger az

Predicted: i love it

Original: great indoor slipper

Predicted: i love this

Original: sizing an issue

Predicted: sandals do not

Original: casio men s atomic solar

Predicted: jc 30

Original: i miss the old one s

Predicted: el salva

Original: clark s shoes

Predicted: i love the

Original: very comfortable but not shaped for a woman

Predicted: i hate wearing

Original: my feet are black

Predicted: i love these

Original: nice quality

Predicted: xl multi

Original: love this shoe
Predicted: love this shoe but

Original: love them
Predicted: a little

Original: great gift
Predicted: i love this

Original: was shocked to were this jacket was manufactured
Predicted: wrangler

Original: four stars
Predicted: slippers are great

Original: seiko men s automatic watch
Predicted: a great watch

Original: very nice
Predicted: sexy

Original: great little pirate outfit for the price
Predicted: i have been

Original: great jeans
Predicted: old lee jeans

Original: comfortable
Predicted: i love it

Original: my wedding band
Predicted: tungsten band

Original: great

Predicted: i love these

Original: eagle creek travel geat pack it

Predicted: eagle

Original: at least my feet are warm

Predicted: cold weather boot

Original: cramps toes

Predicted: i bought these

Original: awesome

Predicted: a great watch

Original: excellant

Predicted: the compartments are

Original: proper size for full length dress

Predicted: length is a

Original: typical no wire support bra

Predicted: wire support ok

Original: not bright green

Predicted: kelly green

Original: typical army duffle

Predicted: army duffles

Original: good price but

Predicted: disappointed with the handle

Original: make sure you have the right expectations

Predicted: sexy

Original: lovely

Predicted: i love this

Original: lovely ring
Predicted: perfect size

Original: poor design
Predicted: the belts are

Original: perfect
Predicted: i needed

Original: adorable
Predicted: soooo cute

Original: pleasant surprise
Predicted: miyot

Original: four stars
Predicted: like jean

Original: these killed my feet
Predicted: mephisto

Original: fit as expected
Predicted: levi 501

Original: almost too good to be true
Predicted: i love these

Original: very good durable product
Predicted: comfortable comfortable and flexible

Original: returned them
Predicted: a little tight

Original: the best denim jacket i have ever owned

Predicted: denim jackets

Original: love it

Predicted: i love it

Original: very good shoe

Predicted: water aerobics shoes

Original: sweet

Predicted: i am not

Original: not impressed

Predicted: i think

Original: dont be frozen

Predicted: great value for the

Original: love these

Predicted: i love these

Original: best surgeon shoes

Predicted: crocs

Original: excellent

Predicted: i love it

Original: good classic

Predicted: timex watch but

Original: my son love them

Predicted: shoes for my son

Original: great value

Predicted: watch for the price

Original: gift but

Predicted: a gift for

Original: thin legs

Predicted: jms

Original: jewelry cleaner

Predicted: ultrasonic cleaner

Original: luv my earrings

Predicted: earring for

Original: comfy and high quality

Predicted: i love these

Original: wonderful shoes for pregnancy

Predicted: crocs

Original: perfect

Predicted: the ring is

Original: for my dancer

Predicted: the best ballet shoes

Original: i love my crocs

Predicted: great clog

Original: beautiful

Predicted: the perfect ballerina

Original: hello kitty is cute but sizes run

Predicted: isn't comfortable

Original: good shoe but beware sizing

Predicted: i really like

Original: quality belt

Predicted: belt at a

Original: they shall they will do for work durable
Predicted: i like it

Original: perfect for my dad
Predicted: timex dad

Original: great products
Predicted: i do not

Original: super soft durable well made slipper
Predicted: i love them

Original: either a little snug or i am having
Predicted: great looking cheap looking

Original: front hook bra
Predicted: i do not

Original: a bear y good shirt
Predicted: alot of

Original: great ballet shoes
Predicted: i bought these

Original: fine watch a little hard to set for some
Predicted: watch for the price

Original: meh
Predicted: sexy

Original: ebags shoe bag
Predicted: i am not

Original: great

Predicted: perfect for winter winter

Original: great for baby soft soft

Predicted: i love these

Original: a perfect little purse

Predicted: attractive purse looks soft

Original: strap works

Predicted: i had to

Original: really nice watch

Predicted: a great watch

Original: i love this

Predicted: maternity belt for

Original: sport

Predicted: nice looking watch strap

Original: i tried to like it

Predicted: i love these

Original: jefferies brand crew length white socks grey

Predicted: socks for my son

Original: stunning necklace

Predicted: i love it

Original: love these

Predicted: it has it is

Original: run extremely small

Predicted: size 18 shirts

Original: it is a very beautiful wallet

Predicted: i love it

Original: great travel shirt
Predicted: tamiami

Original: perfect for travel
Predicted: it has it is

Original: great texture
Predicted: i love it

Original: perfect under shirt
Predicted: i love these

Original: no liquid
Predicted: plastic container plastic container

Original: 501 levi s
Predicted: a little too

Original: blackhawk desert ops boots
Predicted: best boots i

Original: satisfied with purchase
Predicted: a little big

Original: ok but squeaked
Predicted: sucks

Original: a little loose but still comfortable
Predicted: small breasted

Original: very disappointed
Predicted: i do not

Original: love them

Predicted: crocs

Original: lightweight comfortable

Predicted: camisole is

Original: great looking

Predicted: goffs

Original: this is ok but run small

Predicted: the right size is

Original: strap is not as pictured

Predicted: like the shorts

Original: decent purse real leather good value for the price

Predicted: a bit smaller

Original: typical fall off the heel shoe liner

Predicted: toe liners

Original: very good

Predicted: good watch for the

Original: do not do it

Predicted: crocs

Original: argh it constantly rides up

Predicted: argh

Original: cheap quality

Predicted: red purple scarve

Original: aerosoles are soooo comfortable and good

Predicted: i love these

Original: beautiful earrings

Predicted: the earrings came in

Original: disappointed in these shoes

Predicted: i did not

Original: great quality

Predicted: i love these

Original: love this color very neutral

Predicted: crocs

Original: very comfortable

Predicted: panty

Original: great hat for 40 degree weather

Predicted: hat for the

Original: what happened to new balance

Predicted: i do not

Original: nice and long

Predicted: sizing info

Original: very good waist shapewear

Predicted: great for the price

Original: nice size but not military grade

Predicted: a great bag

Original: sturdy

Predicted: dress shoes are not

Original: runs big

Predicted: sizing is

Original: not like previous russell athletic slee

Predicted: the arm holes are

Original: super cute

Predicted: xox

Original: good job

Predicted: shaper is

Original: hmmm well it did kinda work

Predicted: sexy

Original: poorly designed

Predicted: belt sizing

Original: jazz feet

Predicted: saucony is

Original: good work socks

Predicted: i like these

Original: well made but a little big

Predicted: a little big

Original: better than uggs

Predicted: uggs are

Original: blisters

Predicted: i like the

Original: nursing outfits

Predicted: ms in

Original: excellent quality

Predicted: satisfied with these socks

Original: great wrap for a great price

Predicted: i love it

Original: ck prostretch
Predicted: i love these

Original: kind of ugly
Predicted: unattractive

Original: great product
Predicted: i like it

Original: nice bra
Predicted: sensitivity to late

Original: ugly but comfortable
Predicted: i love them

Original: sparkly
Predicted: a gift for

Original: thong nice
Predicted: like thong

Original: comfort that has that is hard to describe
Predicted: i love these

Original: speedos galore
Predicted: man s

Original: great jeans
Predicted: a little longer

Original: great tricorn hat
Predicted: costumer s

Original: love them

Predicted: shoes run a

Original: love it

Predicted: girly girly

Original: nice shoehorn

Predicted: the shoehorn is

Original: champion men

Predicted: good quality and good

Original: the other one sold on amazon is much better

Predicted: the snag

Original: nice hat

Predicted: the color is not

Original: durable but high waisted

Predicted: work pants for work

Original: good as price

Predicted: nice deatil

Original: very nice

Predicted: i love it

Original: i could wear these cream shoes even in winter

Predicted: i love them

Original: so comfortable

Predicted: i love these

Original: great

Predicted: a great under

Original: gildan 7 75 oz sweat

Predicted: i like the

Original: they are great

Predicted: it has it is

Original: this blouse is beautiful and i love the

Predicted: i love this

Original: love reefs

Predicted: i love reef

Original: couldnt read the display returned it

Predicted: the title says it

Original: made a great gift

Predicted: a gift for

Original: i love it

Predicted: sexy

Original: very nice warm socks

Predicted: good looking and warm

Original: simple and smooth

Predicted: a nice tie

Original: handy for quick trip

Predicted: ingrown toen

Original: sterling silver eternty crosspendant 18

Predicted: gift for a

Original: functional but not a fashion statement

Predicted: water proof watch water

Original: not worth it

Predicted: i ordered

Original: great quality and very comfortable
Predicted: comfrotable

Original: mustache fun
Predicted: pros mustaches fake

Original: columbia sportswear men s back
Predicted: good bathing suit

Original: pretty good
Predicted: g shock looks

Original: love this purple watch
Predicted: i love it

Original: amazing
Predicted: ring size up

Original: great black jeans
Predicted: i love this

Original: great watch perfect time looks great
Predicted: i love it

Original: organized and protected
Predicted: great earring

Original: a little snug but comfortable
Predicted: cute but a

Original: as good as advertised
Predicted: japanes

Original: good product

Predicted: good ad

Original: great belt wonderful detail perfect color
Predicted: i love this

Original: dickies quality
Predicted: irrati

Original: country made in depends on fit
Predicted: great fit great fit

Original: nice dinner watch with a sporty look more
Predicted: a great looking

Original: cute comfy
Predicted: uber cute and

Original: i like it she loves it
Predicted: great for the price

Original: pretty style but large calf
Predicted: pleasantly surprised by

Original: pretty little red dress
Predicted: a nice fall

Original: sweet long sleeve shirt
Predicted: seahawk t

Original: in love with this set
Predicted: a good fit

Original: beware these run small
Predicted: flip flops

Original: good little lock

Predicted: tsa

Original: for the
Predicted: i loved it

Original: perfect
Predicted: i needed

Original: perfect fit excellent price
Predicted: dress t shirt

Original: fun
Predicted: niti

Original: mens acu digital t shirt large
Predicted: acu

Original: timex watch
Predicted: look good for

Original: look good very comfortable
Predicted: levi s

Original: men s docker pants
Predicted: i wanted

Original: it works
Predicted: i wish

Original: shirt
Predicted: a nice shirt

Original: nine west satchel
Predicted: roomy and nice

Original: great garden shoe for bad feet

Predicted: i love these

Original: lightweight and comfortable
Predicted: crocs

Original: good for boxer briefs
Predicted: sized large and

Original: the best
Predicted: i love these

Original: she loves it
Predicted: wears a

Original: glad i got a whole size bigger
Predicted: i am glad

Original: super comfy
Predicted: love fitflops

Original: nice handkerchiefs
Predicted: handkerchiefs

Original: she went into a rehab facility and needed some
Predicted: socks for my mom

Original: great purchase
Predicted: i love these

Original: what a statement shoe
Predicted: i love this

Original: sharp shoes
Predicted: husband s favorite

Original: just the thing

Predicted: i love it

Original: too close together

Predicted: i am not

Original: works well but has shortcomings

Predicted: aaa

Original: gold toe quality

Predicted: good socks for the

Original: ginormous

Predicted: i love this

Original: gave it a 4 star for looks but had

Predicted: sizing is

Original: the originals

Predicted: wrangler

Original: perfect

Predicted: tool for watch set

Original: minnetonka men s straight plug mo

Predicted: moccasin

Original: not so comfortable

Predicted: i am disappointed

Original: work well

Predicted: a hat

Original: briefs

Predicted: i love these

Original: great watch

Predicted: a great watch

Original: converse chuck taylor all

Predicted: a sneaker

Original: beautiful

Predicted: i love them

Original: favorite slippers i have ever owned

Predicted: i love these

Original: three stars

Predicted: chain broke easily and

Original: its ok

Predicted: sexy

Original: wow quality matters

Predicted: the best shoe for

Original: five stars

Predicted: buy a size

Original: nice sandals but could be more comfortable

Predicted: nice but scratchy

Original: love

Predicted: my kid loves these

Original: dockers khaki pants

Predicted: comfortable and comfortable and

Original: great for sunny but crisp days

Predicted: vests roomy

Original: also perfect

Predicted: slack

Original: expect shrinkage

Predicted: sizing is

Original: rockport

Predicted: sizing is

Original: carhartt comfort

Predicted: i love it

Original: fast shipping ok product

Predicted: i love it

Original: love them

Predicted: sag

Original: great everyday or t shirt bra

Predicted: i love this

Original: not real impressed

Predicted: i love these

Original: great boots

Predicted: nicer than

Original: wonderful

Predicted: big bust size

Original: perfect

Predicted: i love it

Original: plus size no

Predicted: i love these

Original: like em

Predicted: i like it

Original: wonderful seller

Predicted: i thought it

Original: looks nice

Predicted: sexy

Original: very cute and great for the price

Predicted: a bit small

Original: loved these earrings

Predicted: shiny and strong earrings

Original: nice socks

Predicted: the quality of socks

Original: another hmmmmmm

Predicted: black khaki

Original: shoes

Predicted: rockport upto

Original: good quick shine

Predicted: good for quick shine

Original: nice shirt for the money

Predicted: a good value

Original: beautiful

Predicted: i washe

Original: great underwear

Predicted: i love this

Original: nice bra but not the best sports bra

Predicted: a good bra

Original: my hubby loves it

Predicted: i love it

Original: comfortable and warm but slip off your feet

Predicted: i love these

Original: durable and comfortable too

Predicted: socke

Original: a great pair of leggings

Predicted: leggings for

Original: finally found a sheer yet supportive bra

Predicted: i love this

Original: great cold weather gear

Predicted: i love these

Original: my daughter loves these

Predicted: i love these

Original: nothing special

Predicted: image impressive real

Original: unique and super cute

Predicted: i love them

Original: clog meets sandal

Predicted: inko

Original: kilt wear

Predicted: i love these

Original: great slipper

Predicted: sized too small

Original: my summer favorite
Predicted: arizona

Original: fantastic cream polish
Predicted: fav

Original: bullet proof
Predicted: a tractor trailer

Original: as expected
Predicted: i love this

Original: smooth and silky
Predicted: i love these

Original: happy with this product
Predicted: sizing is

Original: very comfortable wrinkle free nice solid grey color
Predicted: van heus

Original: it has it is really pretty
Predicted: i like it

Original: i wear two stacked best nursing rings ever
Predicted: i love this

Original: not exactly the same as bought at sports expo
Predicted: i love these

Original: it has it is great to be a guy
Predicted: sex appeal

Original: looks nice but feels cheap

Predicted: light belt unpack

Original: lighter weight strapping but good value
Predicted: dockers belts

Original: nice fruit of the loom briefs
Predicted: good quality but not

Original: kd leg warmers
Predicted: i love these

Original: great buy great tee
Predicted: t shirts

Original: these are not murano glass beads
Predicted: infuriating

Original: i would wear them everywhere if i
Predicted: i love these

Original: clarks un parody
Predicted: i love these

Original: vanity fair women coloratura short gown purity blue
Predicted: terrible material and material

Original: nice shaper brief
Predicted: the shaper fabric

Original: works great
Predicted: i love it

Original: love it
Predicted: i love this

Original: great shirt

Predicted: t shirt for

Original: sketchers

Predicted: i am not

Original: great product

Predicted: the best umbrella for

Original: great quality

Predicted: i love it

Original: quality relatively inexpensive

Predicted: good value for money

Original: returned it

Predicted: sexy

Original: watch tool kit

Predicted: the tools worked fine

Original: very high quality

Predicted: leotard

Original: a goody in maroon

Predicted: snags

Original: excellent

Predicted: i love these

Original: no muffin top but horrible squeezed upper thighs

Predicted: sexy

Original: very comfortable and sturdy

Predicted: slippers for tile

Original: light comfort

Predicted: shorts fit

Original: looks nice
Predicted: dickies

Original: cup size is not correct
Predicted: ok but not

Original: very comfortable
Predicted: a good fit

Original: not flattering
Predicted: ok for school

Original: extremely comfortable
Predicted: i like it

Original: my favorite socks
Predicted: 91 2 narrow

Original: excellent shoe
Predicted: sock is

Original: one size fits all
Predicted: i like it

Original: great jewelry organizer
Predicted: sturd

Original: breast cancer awareness bracelets
Predicted: pink cancer bracelets

Original: a good duffle bag despite the material
Predicted: x large bag

Original: not the same as shown on amazon advertisement page

Predicted: shinn

Original: terribly made very disappointed

Predicted: the zipper is not

Original: cheap

Predicted: flims

Original: very comfortable

Predicted: c cup is

Original: fun

Predicted: stretchy but fun

Original: nice compliment

Predicted: little bolier

Original: love these great for jeans soft comfy relaxed but not

Predicted: i love this

Original: very nice

Predicted: i love it

Original: just a little less quality than

Predicted: a little better

Original: fantastic

Predicted: travel cubes

Original: good trousers

Predicted: i like these

Original: very cute and comfortable

Predicted: great set for small

Original: excellent value

Predicted: id credit

Original: satisfied
Predicted: i love this

Original: perfect
Predicted: comfortable flip flop

Original: very nice and good quality
Predicted: nice hoop

Original: quality for a very good price
Predicted: great product for the

Original: very stylish great quality
Predicted: i love these

Original: tip toes are my favorite
Predicted: the best sandals

Original: timex is classic dependable
Predicted: indiglo watch

Original: good shirts
Predicted: texas

Original: dockers men s proposal moc run off
Predicted: dockers men

Original: good product and service but some what larger than it
Predicted: size is a

Original: awesome swimsuit
Predicted: i love this

Original: great

Predicted: great shades for blocking

Original: good pair of shoes

Predicted: i like them

Original: this is amazing

Predicted: i love it

Original: awesome thigh highs

Predicted: i love it

Original: low priced casio

Predicted: value for the money

Original: so buttery rich is this leather

Predicted: soft and roomy

Original: men s belt brown

Predicted: man s belt

Original: best bali style collection for everyday bras

Predicted: sizing is

Original: they fit and they flop

Predicted: good for physical

Original: the husband loves them

Predicted: mens s

Original: good value

Predicted: i like it

Original: good quality

Predicted: poncho

Original: comfortable

Predicted: flin

Original: awesome fit

Predicted: i thought

Original: cannot go wrong with carhartt

Predicted: carhartt women

Original: cute

Predicted: i love it

Original: my fault

Predicted: i ordered

Original: great socks

Predicted: a little stretch

Original: something blue

Predicted: i like them

Original: i love

Predicted: sexy

Original: bali bra back opening

Predicted: i love this

Original: great but

Predicted: em

Original: orange monster collectors watch

Predicted: scuba watch

Original: buxton

Predicted: i love it

Original: first time wearing this particular brand

Predicted: wrights

Original: not enough arch support

Predicted: love the way they

Original: love these earrings

Predicted: beautiful and good quality

Original: levi s men s 505 straight

Predicted: levi s

Original: military standard

Predicted: i love it

Original: sporty snazzy shirts

Predicted: great polo

Original: socks

Predicted: i thought

Original: could live without

Predicted: sizing is

Original: ck rocks

Predicted: good quality good price

Original: attractive but functional

Predicted: merrill

Original: great costume

Predicted: i love spider

Original: se watch band link remover set 5 piece set

Predicted: watch band remover

Original: heaven on your feet

Predicted: tolito men

Original: very nice jeans

Predicted: sexy

Original: exactly what i needed

Predicted: i love this

Original: levi s women s petite 512

Predicted: a bit long

Original: good plain aviators

Predicted: aviators are

Original: i like the boot but it has it is

Predicted: misleading runs large

Original: cute and comfortable

Predicted: i love these

Original: carhartt traditional fit b18

Predicted: levi s

Original: a great looking jacket

Predicted: sizing is

Original: timex kids

Predicted: it smells bad

Original: not bad for the price

Predicted: flims

Original: well made holds multiple garments

Predicted: good quality for the

Original: my single favorite lounge sleeping pantsl

Predicted: pj pants

Original: nicer than expected
Predicted: pleasantly surprised at

Original: great pant for cooler temps
Predicted: good looking pants for

Original: the perfect gift for the man who has 34 everything
Predicted: a gift for

Original: nice looking and fits perfectly
Predicted: lee jeans are

Original: cushiony
Predicted: i will not

Original: they may run a bit large
Predicted: i love these

Original: comfortable ugly
Predicted: i love these

Original: glass colors vary
Predicted: valentine

Original: rubber bracelets
Predicted: em bracelet

Original: love these cute and comfortable
Predicted: crocs

Original: they are popular for a reason
Predicted: sock line

Original: comfort

Predicted: i love these

Original: good choice

Predicted: jeans for my husband

Original: husband loves these

Predicted: my husband loves them

Original: love it

Predicted: good clea

Original: excellent substitute for silver or gold

Predicted: ring looks good

Original: not comfortable for me

Predicted: it has it is

Original: good quality shoes

Predicted: sexy

Original: well designed and nice fabric

Predicted: a great fit

Original: warm and cute

Predicted: i love this

Original: if i was a woman i

Predicted: a gift for

Original: delightful

Predicted: i love these

Original: good quality jacket

Predicted: feb

Original: real leather plus

Predicted: i love this

Original: good quality but bigger and lighter than expected

Predicted: a little tight

Original: these seem great

Predicted: long sle

Original: i love these panties

Predicted: the guy loves these

Original: so comfortable

Predicted: great for work

Original: good sale

Predicted: i need black

Original: okay

Predicted: elastic feels a

Original: pretty rose button earrings

Predicted: pink rose earrings perfect

Original: scuba diver s

Predicted: watch for a

Original: great style and quality

Predicted: the best lame

Original: great sneakers

Predicted: i love these

Original: have always liked this one

Predicted: sock is

Original: if you are between sizes try a hair

Predicted: crocs

Original: great quality looks expensive

Predicted: i am glad

Original: good for the money

Predicted: the best er

Original: fancy replacement for hairband rubberband trick

Predicted: i am not

Original: excellent fit

Predicted: shorts are great

Original: cleavage

Predicted: cleavage

Original: very cool

Predicted: my daughter s

Original: nice pants

Predicted: shorts run

Original: very good

Predicted: i love it

Original: my son loves thse

Predicted: sexy

Original: my favorite new night pants

Predicted: i love them

Original: love these sportsbras

Predicted: i like it

Original: short inseam

Predicted: good quality fit in

Original: perfect for me

Predicted: my favorite expensive wallet

Original: nice shoe

Predicted: tad

Original: nice cotton panties

Predicted: a little too

Original: tinker toy watch band tool

Predicted: i am not

Original: looks nice fits nicely hurts

Predicted: good looking bra but

Original: love these shoes

Predicted: a must have

Original: mary janes are cute and just plain awesome

Predicted: i like it

Original: turned green

Predicted: smelt

Original: wearing it right now

Predicted: the best robe

Original: expecting more

Predicted: flims

Original: beautiful

Predicted: mother likes it

Original: very cute casual

Predicted: size 10 5 shoes

Original: you get what you pay for
Predicted: ok halloween costume

Original: belt
Predicted: i love it

Original: my grandson loves his boots
Predicted: grandson s

Original: new favorite jeans
Predicted: pair of denim

Original: for my needs its great
Predicted: great price good quality

Original: very dorky
Predicted: sizing is

Original: nice pants
Predicted: i love it

Original: looks like pic
Predicted: i love these

Original: sturdy
Predicted: mesh backpacks for

Original: super cute and versatile
Predicted: i love it

Original: nice t shirts
Predicted: wears for 2

Original: awesome

Predicted: good boots for the

Original: beautiful
Predicted: i love it

Original: five stars
Predicted: i count keen

Original: the ideal cleaner for all metals and nearly all
Predicted: rho

Original: good sunglasses but too big right now
Predicted: a little big

Original: handy packer
Predicted: use it all day

Original: my casio chronograph is a form
Predicted: man s watch

Original: does it job material could be different
Predicted: reflective id

Original: nice
Predicted: i love it

Original: super comfy
Predicted: i love them

Original: looks good but came un sewed
Predicted: sexy

Original: great value for dress or casual
Predicted: good looking excellent value

Original: comfort looks feel great shoes

Predicted: pair of loafers

Original: great traing pants

Predicted: great training pants for

Original: great deal

Predicted: a handbag

Original: good fit comfortable underwear

Predicted: migrated a

Original: great dinosaur shirt

Predicted: a gift for

Original: you can trust izod

Predicted: izod men

Original: better than expected

Predicted: great watch for the

Original: love

Predicted: love dansko

Original: nice finish

Predicted: nice polished polished and

Original: you get what you pay for

Predicted: the difference between 5

Original: not my favorites

Predicted: floppy leg

Original: best flip flop

Predicted: fashon

Original: i am a fan of sketchers so

Predicted: custom inserts for

Original: i love having little feet

Predicted: i like these

Original: very well made

Predicted: i love it

Original: light and lovely

Predicted: these earrings are great

Original: great backpack

Predicted: i love this

Original: my husband loved it

Predicted: my husband loves it

Original: love these

Predicted: great work hat

Original: just needed new ones and this was the most easy

Predicted: mcd

Original: warm socks or liners

Predicted: sock

Original: great

Predicted: i love it

Original: like alot

Predicted: i like the

Original: great

Predicted: sexy

Original: great boots

Predicted: i wear them

Original: classic

Predicted: size 11 s

Original: color shipped did not match the web site

Predicted: color is not as

Original: great hat

Predicted: hats for

Original: shoe and back saver

Predicted: shoe horn length

Original: the most perfect bag ever

Predicted: i love it

Original: a little flimsy but still

Predicted: flims

Original: i really like these shoes

Predicted: thongs

Original: good cheap amber glasses

Predicted: i do not

Original: great craft fun

Predicted: a gift for

Original: ss citrine celtic drop earrings

Predicted: a little small

Original: practical work pants

Predicted: i did not

Original: these crocs rock

Predicted: crocs

Original: cute and very stretchy

Predicted: a little

Original: these are mens tricky to adjust width

Predicted: i did not

Original: hot feet

Predicted: light weight brook

Original: cannot beat gold toe

Predicted: gold toe socks

Original: new englander rain jacket aqua reflective

Predicted: prius

Original: beautiful sandal

Predicted: a great sandal

Original: i bought these to replace a previous

Predicted: skechers

Original: great for packing small items

Predicted: hosiery

Original: toms are winners

Predicted: toms are

Original: extremely comfortable shoes

Predicted: burgundy

Original: nice

Predicted: vf pan

Original: i love it

Predicted: figure flattering cut

Original: carhartt double front
Predicted: great quality carhart

Original: exactly as described
Predicted: sock for

Original: yagh
Predicted: flims

Original: great fit over sunglasses
Predicted: i love these

Original: great sweater
Predicted: i guess it

bleu, precisions, bp, ratio, translation_length, reference_length (0.0,
[0.450404365195362, 0.0, 0.0, 0.0], 1.0, 11.616298811544992, 205260, 17670)
rouge2 (0.13338051547049276, 0.20700598071524473, 0.0983872839076459)
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