Using pretrained word embeddings

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In [ ]: # pretrained word embeddings
        ### Hossein Yousefi

In [9]: #Downloading the IMDB data from http://mng.bz/0tIo
        import os

        imdb_dir = '/home/hossein/Downloads/wordembedding/aclImdb'
        train_dir = os.path.join(imdb_dir , 'train')

        labels = []
        texts = []

        for label_type in ['neg', 'pos']:
            dir_name = os.path.join(train_dir, label_type)
            for fname in os.listdir(dir_name):
                if fname[-4:] == '.txt':
                    f = open(os.path.join(dir_name, fname))
                    texts.append(f.read())
                    f.close()
                    if label_type == 'neg':
                        labels.append(0)
                    else:
                        labels.append(1)

In [15]: #Tokenizing and vectorizing the data
         from keras.preprocessing.text import Tokenizer
         from keras.preprocessing.sequence import pad_sequences
         import numpy as np

         maxlen = 100
         training_samples = 200
         validation_samples = 10000
         max_words = 10000

         tokenizer = Tokenizer(num_words=max_words)
         tokenizer.fit_on_texts(texts)
         sequences = tokenizer.texts_to_sequences(texts)
         word_index = tokenizer.word_index
         print('found %s unique tokens.' % len(word_index))
         data = pad_sequences(sequences, maxlen=maxlen)
         labels=np.asarray(labels)
         print('shape of data tensor :', data.shape)
         print('shape of label tensor :', labels.shape)

         indices = np.arange(data.shape[0])
         np.random.shuffle(indices)
         data = data[indices]
         labels = labels[indices]

         x_train = data[:training_samples]
         y_train = labels[:training_samples]
         x_val = data[training_samples: training_samples + validation_samples]
         y_val = labels[training_samples: training_samples + validation_samples]
```

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found 88582 unique tokens.
shape of data tensor : (25000, 100)
shape of label tensor : (25000,)
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In [19]: # Download from  https://nlp.stanford.edu/projects/glove/
         glove_dir = '/home/hossein/Downloads/wordembedding/glove.6B'
         embeddings_index = {}
         f = open(os.path.join(glove_dir, 'glove.6B.100d.txt'))
         for line in f:
             values = line.split()
             word = values[0]
             coefs = np.asarray(values[1:], dtype='float32')
             embeddings_index[word] = coefs
             f.closed
```

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In [20]: embedding_dim = 100

         embedding_matrix = np.zeros((max_words, embedding_dim))
         for word, i in word_index.items():
                 if i < max_words:
                     embedding_vector = embeddings_index.get(word)
                     if embedding_vector is not None:
                         embedding_matrix[i] = embedding_vector
```

```
In [22]: from keras.models import Sequential
         from keras.layers import Embedding, Flatten, Dense

         model = Sequential()
         model.add(Embedding(max_words, embedding_dim, input_length=maxlen))
         model.add(Flatten())
         model.add(Dense(32, activation='relu'))
         model.add(Dense(1, activation='sigmoid'))
         model.summary()

         model.layers[0].set_weights([embedding_matrix])
         model.layers[0].trainable = False
```

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_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
embedding_2 (Embedding)      (None, 100, 100)          1000000
_________________________________________________________________
flatten_2 (Flatten)          (None, 10000)             0
_________________________________________________________________
dense_3 (Dense)              (None, 32)                320032
_________________________________________________________________
dense_4 (Dense)              (None, 1)                 33
=================================================================
Total params: 1,320,065
Trainable params: 1,320,065
Non-trainable params: 0
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In [23]: #traninig
         model.compile(optimizer='rmsprop',
                      loss='binary_crossentropy',
                      metrics=['acc'])
         history = model.fit(x_train, y_train,
                            epochs=10,
                            batch_size=32,
                            validation_data=(x_val, y_val))
         model.save_weights('pre_trained_glove_model.h5')
```

```
Train on 200 samples, validate on 10000 samples
Epoch 1/10
200/200 [==============================] - 2s 9ms/step - loss: 1.9133 - acc: 0.5150 - val_loss
Epoch 2/10
200/200 [==============================] - 1s 6ms/step - loss: 0.6362 - acc: 0.6650 - val_loss
Epoch 3/10
200/200 [==============================] - 1s 5ms/step - loss: 0.3214 - acc: 0.8700 - val_loss
Epoch 4/10
200/200 [==============================] - 1s 5ms/step - loss: 0.4858 - acc: 0.8500 - val_loss
Epoch 5/10
200/200 [==============================] - 1s 5ms/step - loss: 0.1740 - acc: 0.9550 - val_loss
Epoch 6/10
200/200 [==============================] - 1s 5ms/step - loss: 0.0705 - acc: 1.0000 - val_loss
Epoch 7/10
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200/200 [==============================] - 1s 5ms/step - loss: 0.2936 - acc: 0.8950 - val_loss
Epoch 8/10
200/200 [==============================] - 1s 5ms/step - loss: 0.0483 - acc: 1.0000 - val_loss
Epoch 9/10
200/200 [==============================] - 1s 6ms/step - loss: 0.0234 - acc: 1.0000 - val_loss
Epoch 10/10
200/200 [==============================] - 1s 5ms/step - loss: 0.0182 - acc: 1.0000 - val_loss
```

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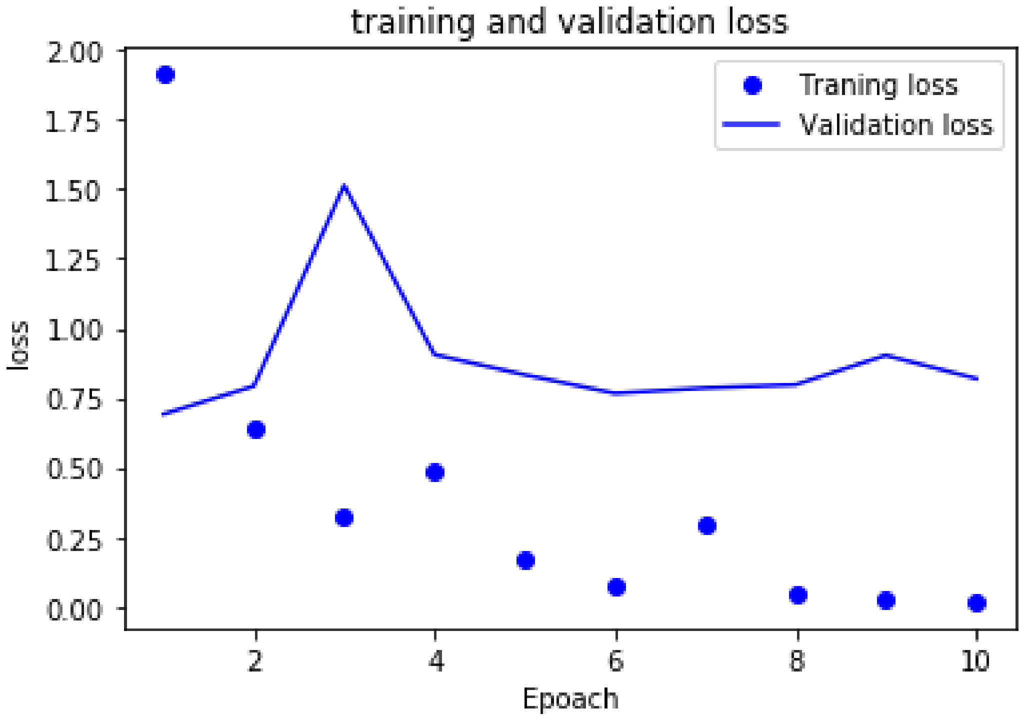
In [25]: import matplotlib.pyplot as plt

         history_dict = history.history
         loss_values = history_dict['loss']
         val_loss_values = history_dict['val_loss']

         epochs = range(1, len(loss_values) + 1)

         plt.plot(epochs,loss_values, 'bo', label='Traning loss')
         plt.plot(epochs,val_loss_values, 'b', label='Validation loss')
         plt.title('training and validation loss')
         plt.xlabel('Epoach')
         plt.ylabel('loss')
         plt.legend()
         plt.show()
```



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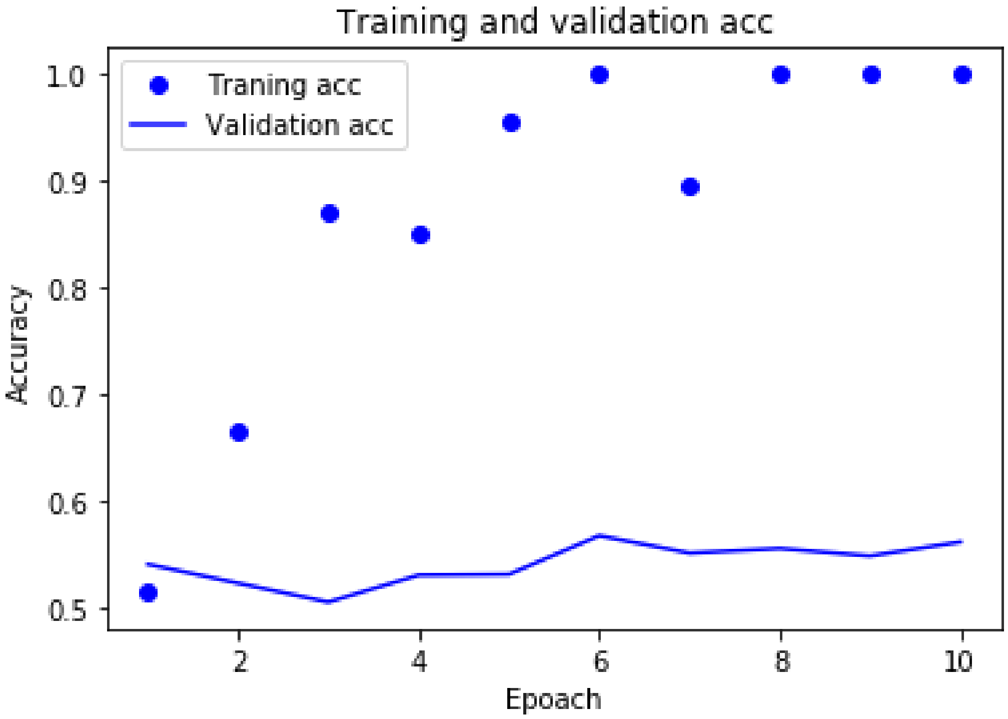
In [26]: plt.clf()
         acc_values = history_dict['acc']
         val_acc_values = history_dict['val_acc']

         plt.plot(epochs,acc_values, 'bo', label='Traning acc')
         plt.plot(epochs,val_acc_values, 'b', label='Validation acc')
         plt.title('Training and validation acc')
         plt.xlabel('Epoach')
         plt.ylabel('Accuracy')
         plt.legend()
         plt.show()
```



```
In [28]: #Evaluation on the test data
         test_dir = os.path.join(imdb_dir, 'test')

         labels =[]
         texts = []

         for label_type in ['neg', 'pos']:
             dir_name = os.path.join(test_dir, label_type)
             for fname in sorted(os.listdir(dir_name)):
                 if fname[-4:] == '.txt':
                     f = open(os.path.join(dir_name, fname))
                     texts.append(f.read())
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            f.close()
            if label_type == 'neg':
                labels.append(0)
            else:
                labels.append(1)
sequences = tokenizer.texts_to_sequences(texts)
x_test = pad_sequences(sequences, maxlen=maxlen)
y_test = np.asarray(labels)
model.load_weights('pre_trained_glove_model.h5')
model.evaluate(x_test, y_test)
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25000/25000 [==============================] - 3s 108us/step
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Out[28]: [0.8014758405303956, 0.57724]
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