

Recurrent neural networks

Practice Session 12

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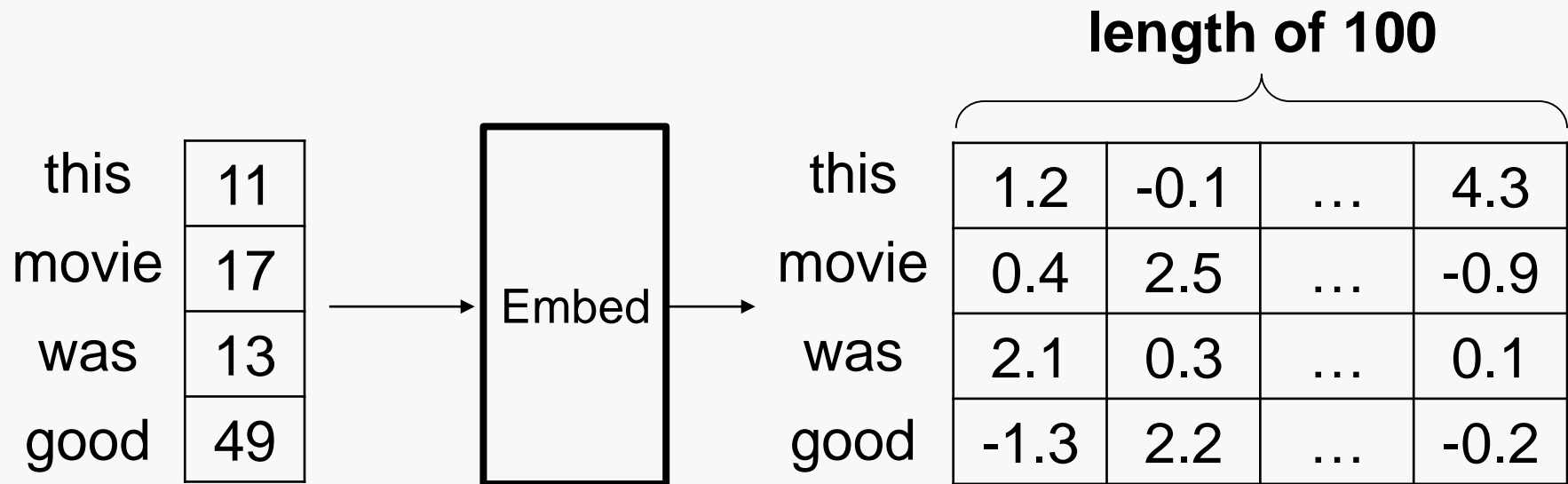
Outline

Will implement two RNN models:

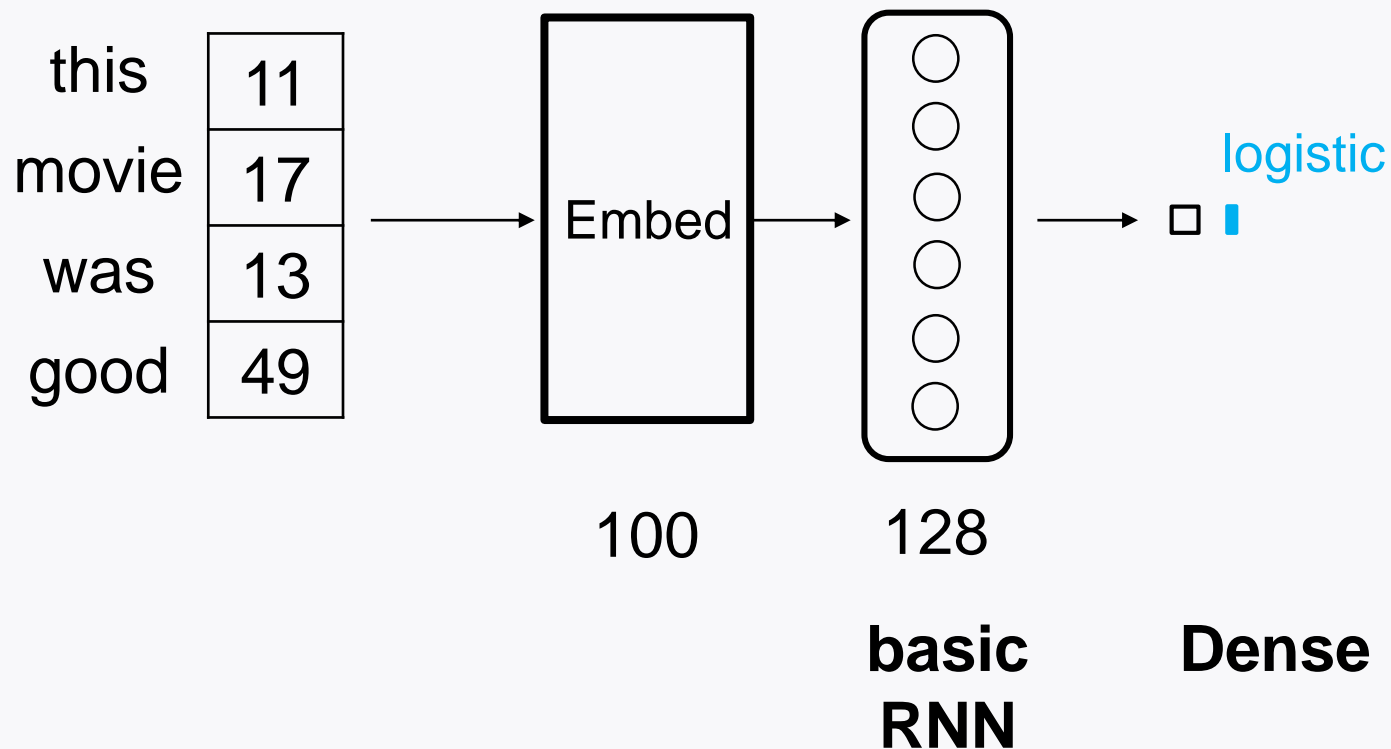
1. Basic RNN

2. LSTM

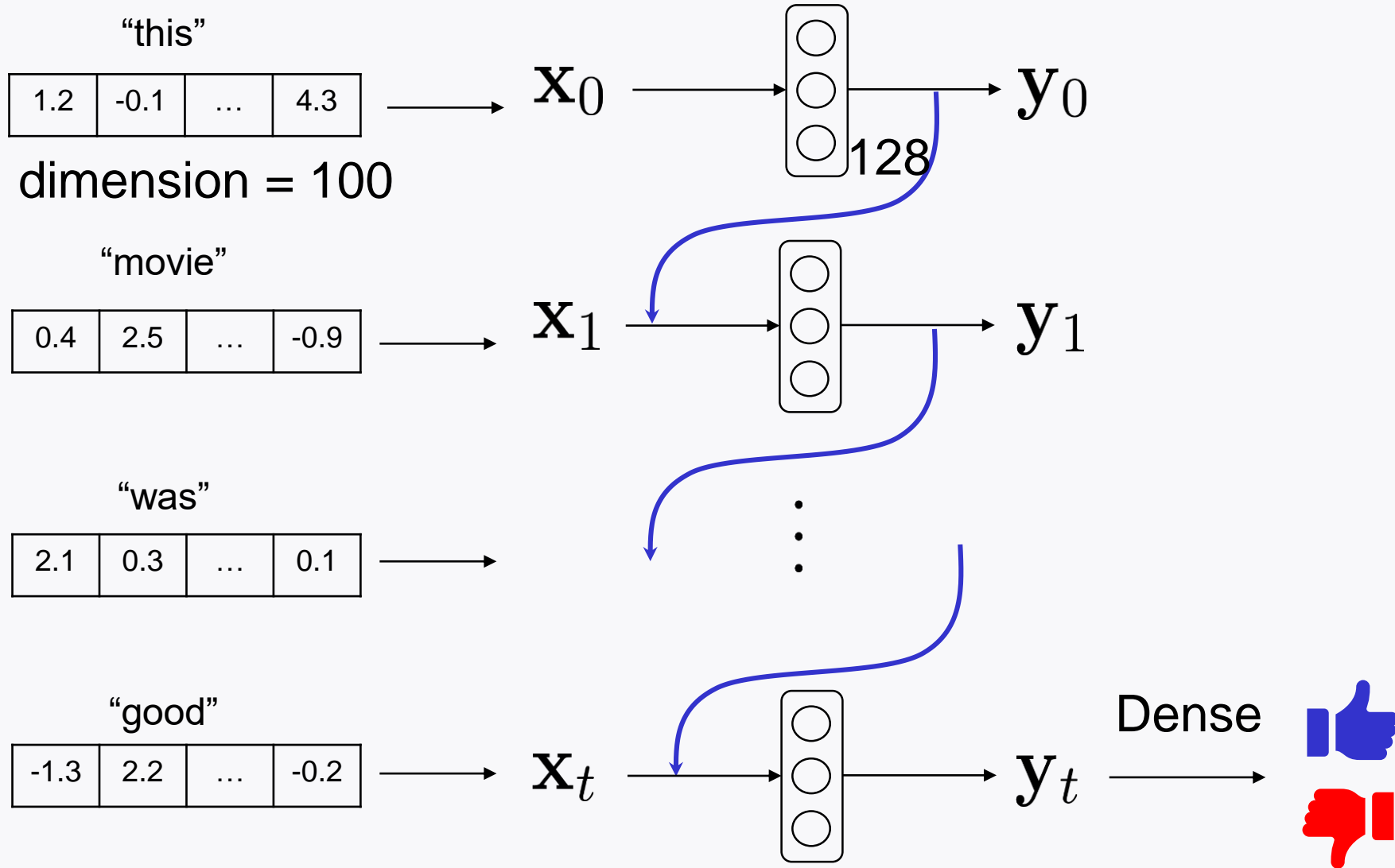
Basic RNN



Basic RNN



Basic RNN: Unrolled version



Loading IMDB

```
from tensorflow.keras.datasets import imdb

(X_train,y_train), (X_test,y_test) = imdb.load_data(num_words=10000)

from tensorflow.keras.preprocessing.sequence import pad_sequences

max_len = 256
X_train_pad = pad_sequences(X_train,value=0, padding='post', maxlen=max_len)
X_test_pad = pad_sequences(X_test, value=0, padding='post',maxlen=max_len)
```

Basic RNN: Tensorflow coding

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import Embedding
from tensorflow.keras.layers import SimpleRNN

basic_rnn = Sequential()
basic_rnn.add(Embedding(input_dim=10000, output_dim=100, input_length=256))
basic_rnn.add(SimpleRNN(128))
basic_rnn.add(Dense(1, activation='sigmoid'))

basic_rnn.compile(optimizer='adam', loss='binary_crossentropy', metrics='acc')

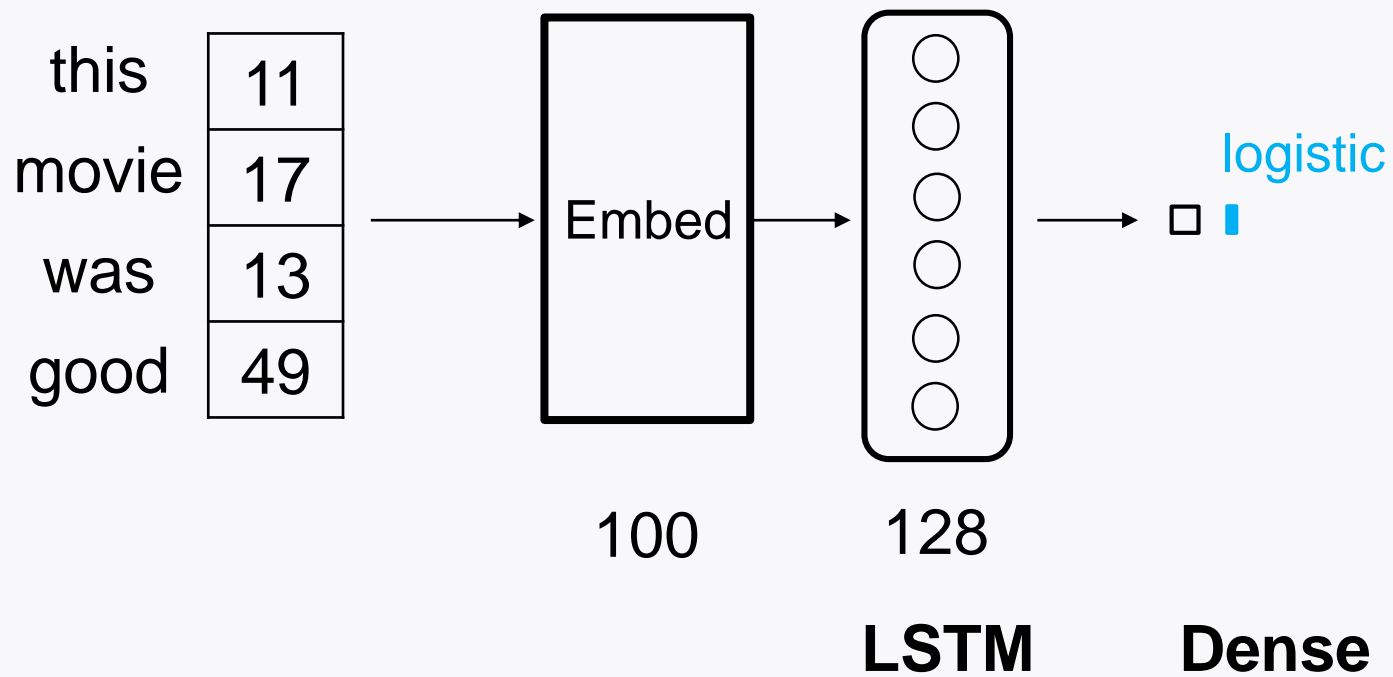
history_basic_rnn = basic_rnn.fit(X_train_pad, y_train, epochs=10)
```

Basic RNN: Performance

```
test_performance = basic_rnn.evaluate(X_test_pad, y_test)
print(test_performance)
```

```
782/782 [=====] - 8s 10ms/step - loss: 0.7149 - acc: 0.5500
[0.7149398922920227, 0.5500400066375732]
```


LSTM



LSTM: Tensorflow coding

```
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import Embedding
from tensorflow.keras.layers import LSTM

LSTM_model = Sequential()
LSTM_model.add(Embedding(input_dim=10000,output_dim=100,input_length=256))
LSTM_model.add(LSTM(128))
LSTM_model.add(Dense(1,activation='sigmoid'))

LSTM_model.compile(optimizer='adam',
                    loss='binary_crossentropy',
                    metrics='acc')

LSTM_model.fit(X_train_pad,y_train, epochs=10)
```

LSTM: Performance

```
test_performance = LSTM_model.evaluate(X_test_pad, y_test)  
print(test_performance)
```

```
loss: 0.4696 - acc: 0.8592
```