CSCI 544 - Homework Assignment 4
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Task 1 -

Constructed simple biLSTM model with architecture as follows -

```
    model = BLSTM1(vocab_size, cap_embed_size=10)
    print(model)
 ✓ 0.0s
BLSTM1(
  (embedding): Embedding(14444, 100, padding_idx=0)
  (cap_embedding): Embedding(3, 10, padding_idx=0)
  (lstm): LSTM(110, 256, batch_first=True, bidirectional=True)
  (dropout): Dropout(p=0.33, inplace=False)
  (linear): Linear(in_features=512, out_features=128, bias=True)
  (elu): ELU(alpha=1.0)
  (out): Linear(in_features=128, out_features=9, bias=True)
)
```

Observed that the capital embedding layer improved performance and decided to keep it. Initialized cap_embedding layer with vectors of uniform(- $\sqrt{3/dim}$, $\sqrt{3/dim}$), LSTM bias with 0, LSTM weights with uniform(- $\sqrt{6/dims}$, $\sqrt{6/dims}$)

Hyperparameters -

1. Training batch size - 9, shuffle=True
2. Learning rate - 0.5
3. Scheduler - ReduceLROnPlateau(SGD optimizer, ‘min’, 0.5)

Precision, Recall and F1 scores on Dev Data from conll03eval script -

```
C:\Users\karav\Desktop\Applied NLP\HW4>perl conll03eval.txt < predictions_og.txt
processed 51578 tokens with 5942 phrases; found: 5988 phrases; correct: 4984.
accuracy:  97.27%; precision:  83.23%; recall:  83.88%; FB1:  83.55
              LOC: precision:  88.49%; recall:  90.36%; FB1:  89.42  1876
             MISC: precision:  79.22%; recall:  78.96%; FB1:  79.09  919
              ORG: precision:  74.35%; recall:  76.29%; FB1:  75.30  1376
              PER: precision:  86.57%; recall:  85.40%; FB1:  85.98  1817
```

Task 2 -

Constructed biLSTM with same architecture -

```
    model = BLSTM2(len(glove_vocab), glove_embeddings, cap_embed_size=10)
    print(model)
```
✓ 0.2s

```
BLSTM2(
  (embedding): Embedding(14444, 100, padding_idx=0)
  (cap_embedding): Embedding(3, 10, padding_idx=2)
  (lstm): LSTM(110, 256, batch_first=True, bidirectional=True)
  (dropout): Dropout(p=0.33, inplace=False)
  (linear): Linear(in_features=512, out_features=128, bias=True)
  (elu): ELU(alpha=1.0)
  (out): Linear(in_features=128, out_features=9, bias=True)
)
```

Dealt with case-sensitivity issue of GloVe by adding a boolean_mask to signify case type of word and pass through a capitalization embedding layer of dimensions 10.

Initialized cap_embedding layer with vectors of uniform(-$\sqrt{3/dim}$, $\sqrt{3/dim}$), LSTM bias with 0, LSTM weights with uniform(-$\sqrt{6/dims}$, $\sqrt{6/dims}$).

Hyperparameters -

4. Training batch size - 9, shuffle=True
5. Learning rate - 0.5
6. Scheduler - CyclicLR(SGD optimizer,0.0105, 0.5)

Precision, Recall and F1 scores on Dev Data from conll03eval script -

```
C:\Users\karav\Desktop\Applied NLP\HW4>perl conll03eval.txt < predictions1_cp.txt
processed 51578 tokens with 5942 phrases; found: 6276 phrases; correct: 5167.
accuracy:  97.62%; precision:  82.33%; recall:  86.96%; FB1:  84.58
             LOC: precision:  92.21%; recall:  91.51%; FB1:  91.86  1823
            MISC: precision:  64.06%; recall:  82.75%; FB1:  72.22  1191
             ORG: precision:  73.38%; recall:  80.16%; FB1:  76.62  1465
             PER: precision:  91.71%; recall:  89.47%; FB1:  90.57  1797
```