

Lab 7 - Transforming Sequences

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1 Sequence-to-Sequence Modelling

1.1 Complete and train a sequence-to-sequence model

The forward method of the Encoder class of the sequence-to-sequence model is given below

```
def forward(self, src):  
    embedded = self.embedding(src)  
    output, (hidden, cell) =  
        self.rnn(embedded)  
    return hidden, cell
```

The Loss curve of the sequence to sequence model is given in Figure 1.

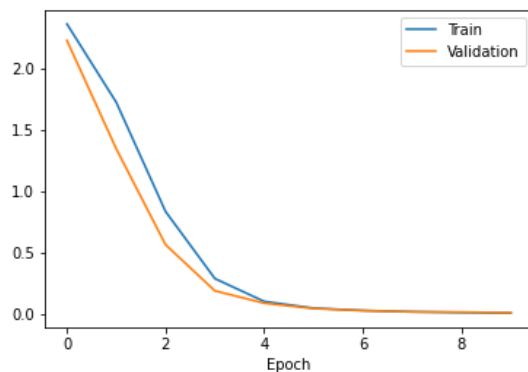


Figure 1: Loss curves

1.2 Now use it!

The decoded outputs obtained are given below.

Listing 1: Decoded output.

```
answer the following  
why is the order of the output reversed  
what is the point of teacher forcing
```

Why is the order of the output reversed

The Seq2seq paper states that reversing the source sentence improves the learning ability of LSTM. One of the reasons mentioned in the paper is the introduction of some short term dependencies to the dataset. When the source sentence is reversed and concatenated with target the first few words in source are close to first few sentence in target. This can help backpropagation to establish connection between source and target sentence faster thus improving the model performance. So we train with reversed inputs which inturn produce the reversed outputs.

What is the point of teacher forcing

Many sequence prediction models use output from previous step as input for current step. These models tend to have slower convergence and model instability. Teacher forcing

is an approach that addresses these issues. Instead of prior output teacher forcing uses ground truth as input. Teacher forcing is a fast and effective but it can also result in fragile/limited models.

1.3 Sequence Lengths

LSTM are good at learning and remembering long sequence of inputs. But when inputs are long and outputs available are less then LSTM will become challenging to use. When we try to combine chunks into longer sequence and decode them the outputs end up missing letters at the boundaries.