HW 5: Neural Networks
Advanced Machine Learning

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1 Back-propagation (gradient descent) equations (10 points)

Derive the back-propagation equations for 2-layer neural network for binary classification. Use the cross-entropy loss function and Relu ($max(0, x)$) as the activation function.

2 Neural window model for named entity recognition (20 points)

Named Entity Recognition (NER) is an important task in natural language processing. In this assignment you will implement a neural network model for NER. In particular you will implement an approach called Sliding Window Neural Network.

Here are the steps see the template from canvas for details

1. Write the function *dataset_encoding* that does label encoding on the original data.
2. Write a dataset that takes the encoded data and produces the sliding window dataset.
3. Write the model (see slides on Lecture 11).
4. Write the training loop (*train_model*) and metrics function (*valid_metrics*)

2.1 Deliverables

Use your code to populate `ner.py`. After you are done make sure you can run:

```
pytest  test_ner.py
```