



# **BUS 243**

**Lecture 8: CNN and review**

*The non-linearity of the network, as well as the ability to easily integrate pre-trained word embeddings, often lead to superior classification accuracy* – Yoav Goldberg



# CONVOLUTION NEURAL NETS

- However, you will see that the model with pre-trained embedding in homework 5 perform worse
- It is not because the embedding, but because the modeling choice
- So far, the NNs considered have all been fully connected
  - What's the meaning?



- Consider image classification task
  - Fully connected model
    - Absolute value of light intensities at global level
  - Hardly make sense in general
    - Differences in pixel values at local level
- CNN is taking account kind of window!



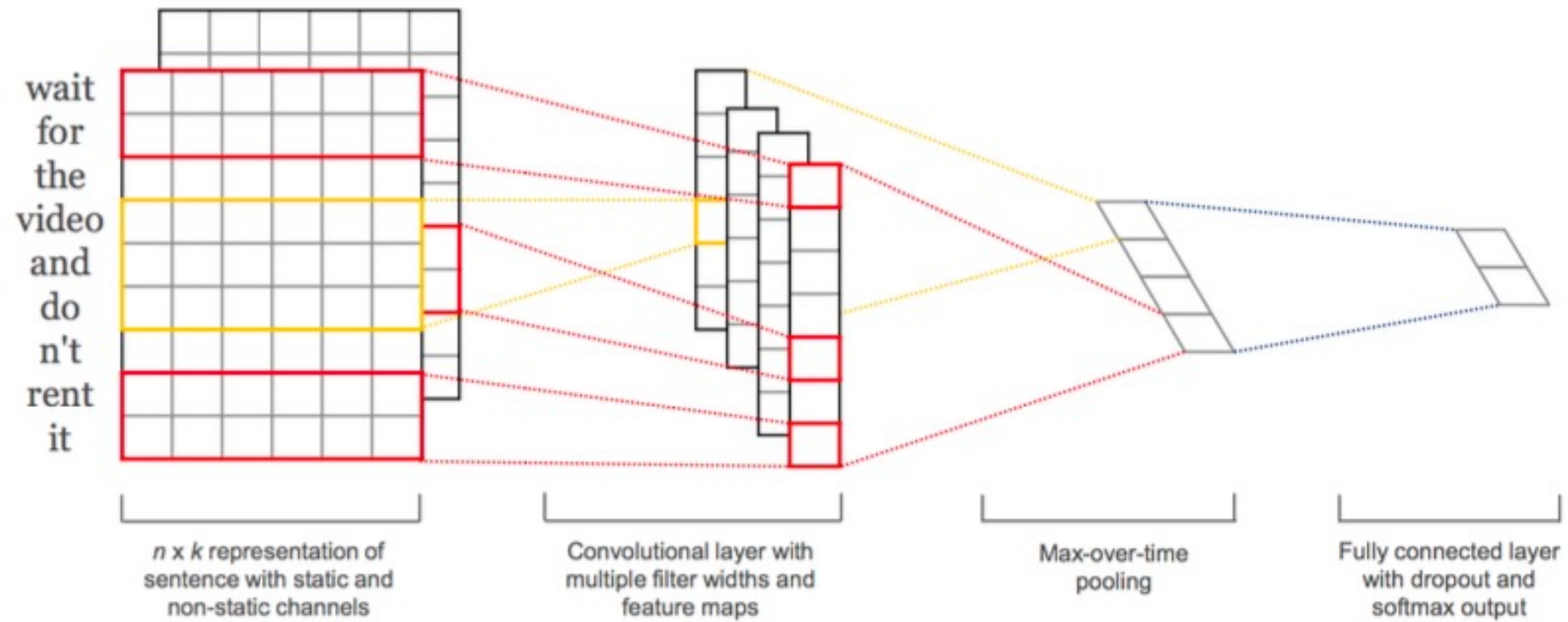
- *Despite little tuning of hyperparameters, a simple CNN with one layer of convolution performs remarkably well. Our results add to the well-established evidence that unsupervised pre-training of word vectors is an important ingredient in deep learning for NLP – Yoon Kim*



- You can get good results for document classification with a single layer CNN
- In a convolutional layer, you can specify the size of the window, often referred to as the *kernel size* or *filter size*
  - small matrix that slides over the input data
  - determines the receptive field or the area of input that the kernel considers at each step







- Some hyperparameters matter more than others
- Unfortunately, a downside is that they require practitioners to specify the exact model architecture to be used and to set the accompanying hyperparameters.
  - Same as determining the size of window





- Using IMDB movie review data, let's see all the necessary steps for CNN classification
- Good for review what we have learned and check where CNN could be used



# CNN (OR GENERAL) PIPELINE

- You will see that major part of text classification is on data preparation thanks to deep learning platform
- You have to think 3 steps at least
  - Validation method
    - how to split data?
  - Normalization
    - Data!
  - Vocabulary

