

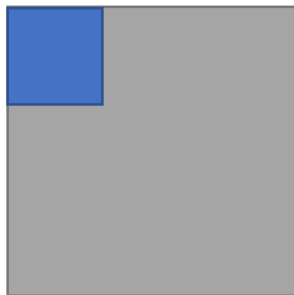
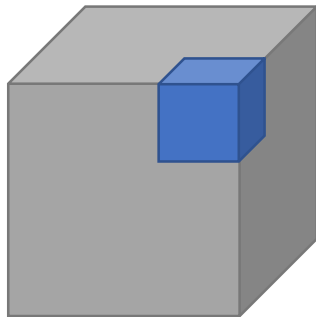
# DL2.0 Bootcamp

## CNNs for Text

By Kingsley Kuan

# CNNs in Other Dimensions

- 3D CNN - Sliding window over 3D data
  - eg. Volumetric data (width, height, depth)
- 2D CNN – Sliding window over 2D data
  - eg. Image data (width, height)
- 1D CNN – Sliding window over 1D data
  - Eg. Temporal data (data over time)



# Text Representations

- How do we represent sentence text as a matrix?
  - “I stayed at Marina Bay Sands last weekend”
1. Words can be indexed into a one-hot vector
    - Results in sparse vectors
  2. Convert words into word embeddings using Word2Vec, GloVe, etc

# Word Embeddings

- Word embedding models allow text to be embedded / represented in vector space
- Similar words are located closely together in vector space

Word embeddings capture syntactic and semantic regularities, allowing algebraic operations.

Eg.

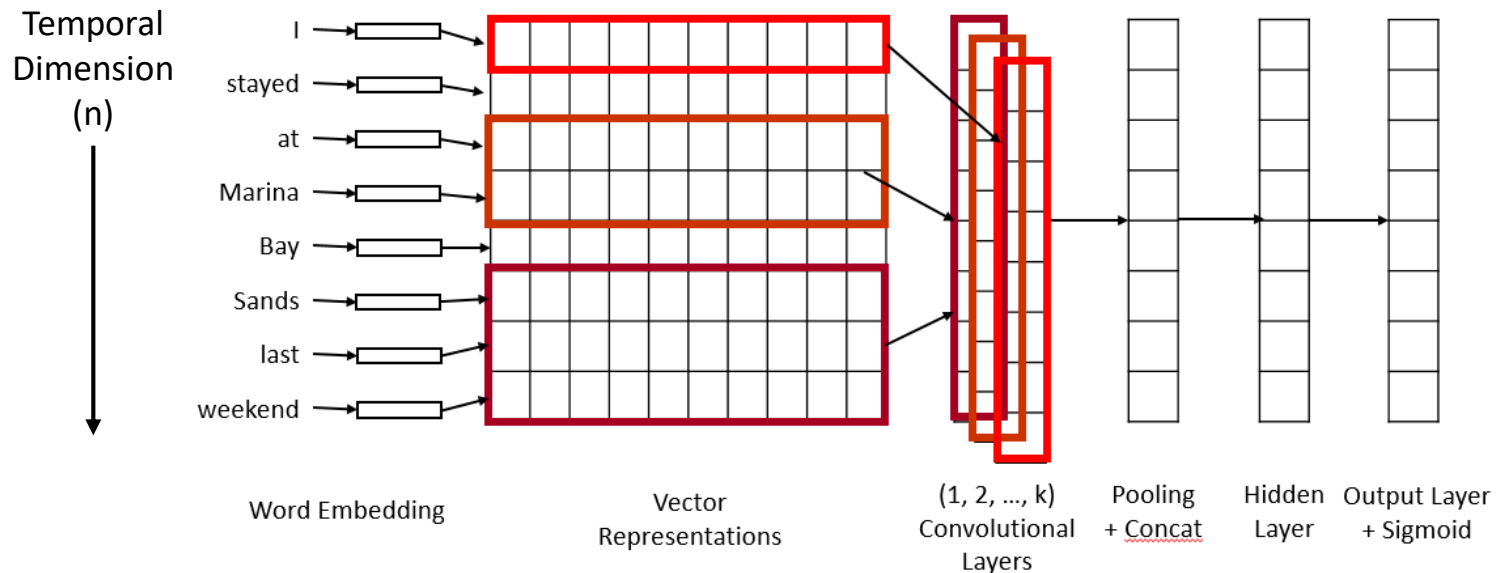
King – Man + Woman  
= Queen



Useful starting point for Text CNNs!

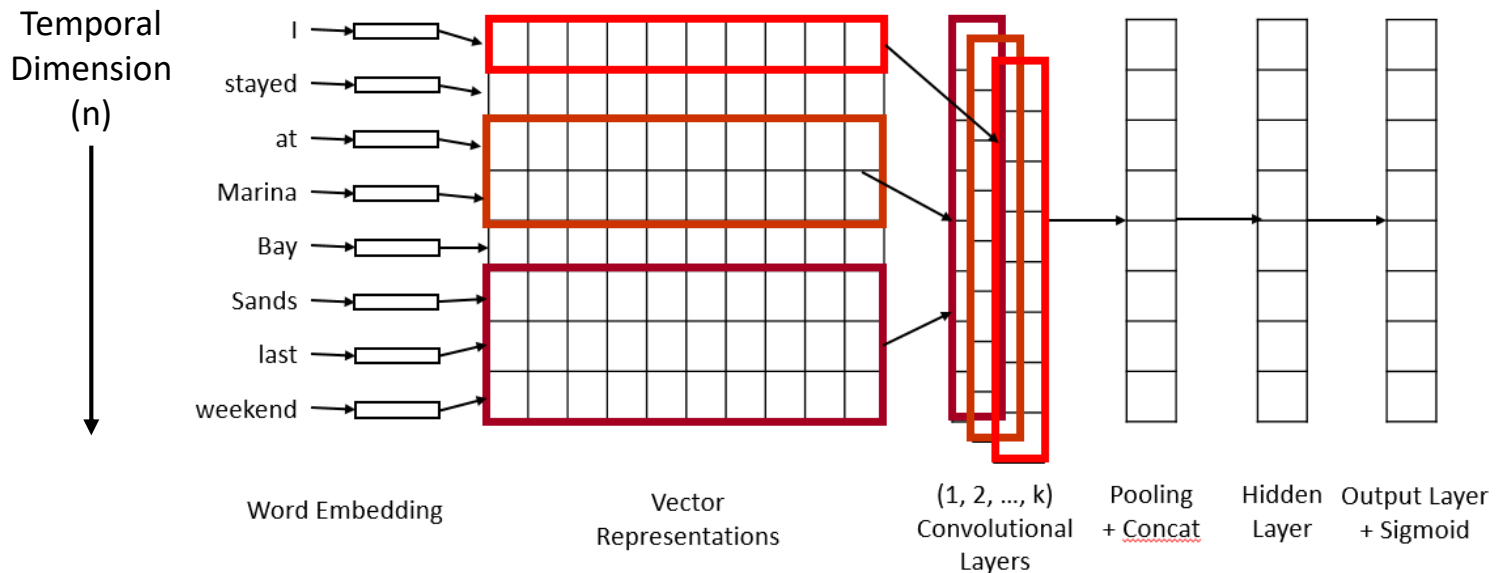
# Text CNNs

- Convert sentences into  $n \times 300$  matrices using Word2Vec
- Slide convolutions across the temporal dimension
- Notice that we use multiple convolutions of different filter sizes in parallel
  - Similar to n-gram



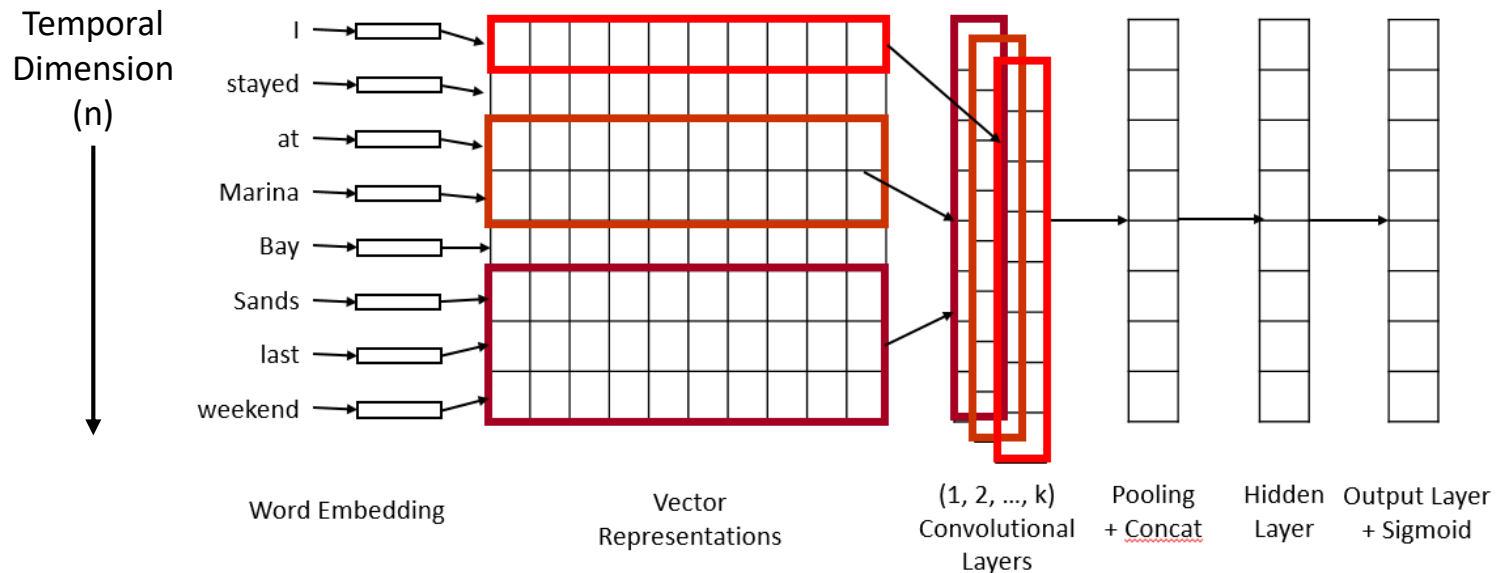
# Text CNNs

1.  $n \times 300 \rightarrow n \times k \times 512$ 
  - where  $k$  is the number of parallel convolutions
2. Max pool across temporal dimension  $n$  and concatenate across  $k \rightarrow (k \times 512)$  vector



# Text CNNs

3. Fully connected hidden layer
4. Fully connected output layer
  - Softmax for mutually exclusive classes
  - Sigmoid otherwise



# Code Walkthrough

Applying Text CNNs to YouTube Titles



# References

- Mikolov, Tomas, Wen-tau Yih, and Geoffrey Zweig. "Linguistic regularities in continuous space word representations." hlt-Naacl. Vol. 13. 2013. <http://www.aclweb.org/anthology/N13-1090>
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