Singular Value Decomposition (SVD) in Natural Language Processing (NLP)

Dayuan Jian: [jian4@wisc.edu](mailto:jian4@wisc.edu) 9075253105

Deming Kong: [dkong25@wisc.edu](mailto:dkong25@wisc.edu) 9075639790

Yuhao Liu: [liu697@wisc.edu](mailto:liu697@wisc.edu) 9077738517

**Topic:**

In class, we have seen that in real problems where noise is likely to be present, techniques like SVD are pretty useful as only dominant components are kept. Thus, the impact of noise can be reduced. We think this technique (SVD) can be used in many applications, including natural language processing (NLP). NLP is dealing with how computers can “understand” what people say, and makes it possible for people to talk with a machine verbally. In our project, we would like to show how SVD can be used in NLP algorithms. We will explain the basic processes, concepts, and usage of NLP and the present students with examples that show how SVD can be effectively applied to NLP algorithms.

**Learning Objective:**

1. Understand what is NLP and its importance:

Students will be able to explain the basic definition of NLP and why it can be based on machine learning.

Students will get an overview of the current and potential applications of NLP.

1. Understand the basic processes and concepts of NLP:

Students will be able to explain the preprocess (tokenization/text normalization), Zipf’s Law, Bag-of-Words and Cosine Similarity with mathematical background provided by ECE 532. And they will be able to solve related problems with the mathematical knowledge learned from ECE 532.

1. Understand the application of SVD in NLP:

Students will be able to know how SVD is utilized in NLP algorithms and they will be able to solve the activity problems relating to SVD’s application in NLP. They will also be exposed to NLP algorithms in which SVD plays a role.