

We work with the 5 words listed below. Sense counts and total count per sense is also listed.

WORD: SERVE

Number of senses: 8

Count for serve%2:34:01::: 5
Count for serve%2:42:03::: 25
Count for serve%2:41:02::: 7
Count for serve%2:41:00::: 10
Count for serve%2:33:00::: 9
Count for serve%2:42:02::: 3
Count for serve%2:42:01::: 7
Count for serve%2:34:00::: 4
Total Count: 70

WORD: BACK

Number of senses: 12

Count for back%4:02:01::: 15
Count for back%2:40:00::: 2
Count for back%4:02:04::: 83
Count for back%4:02:05::: 22
Count for back%1:08:00::: 34
Count for back%1:15:02::: 3
Count for back%4:02:00::: 36
Count for back%1:06:00::: 9
Count for back%4:02:06::: 13
Count for back%3:00:00::: 17
Count for back%2:41:00::: 3
Count for back%2:38:00::: 2
Total Count: 239

WORD: LEFT

Number of senses: 18

Count for leave%2:40:01::: 4
Count for leave%2:38:01::: 64
Count for left%1:15:00::: 11
Count for left%5:00:00:unexhausted:00: 12
Count for left%3:00:00::: 33
Count for leave%2:31:05::: 23
Count for leave%2:42:02::: 31
Count for left%1:08:00::: 2
Count for leave%2:38:00::: 8
Count for leave%2:30:02::: 13
Count for leave%2:42:03::: 3
Count for leave%2:41:00::: 3
Count for leave%2:40:02::: 2
Count for leave%2:42:01::: 10
Count for leave%2:40:06::: 5
Count for leave%2:42:00::: 6
Count for left%1:06:00::: 2
Count for leave%2:30:03::: 2

Total Count: 234

WORD: RIGHT

Number of senses: 14

Count for right%1:07:00::: 26
Count for right%4:02:04::: 13
Count for right%4:02:08::: 12
Count for right%1:15:00::: 12
Count for right%4:02:09::: 11
Count for right%3:00:02::: 18
Count for right%3:00:00::: 19
Count for right%3:00:01::: 10
Count for right%5:00:01:proper:00: 11
Count for right%4:02:03::: 2
Count for right%4:02:07::: 2
Count for right%1:04:00::: 2
Count for right%1:14:00::: 3
Count for right%1:06:00::: 7
Total Count: 148

WORD: OPEN

Number of senses: 13

Count for open%5:00:00:public:00: 6
Count for open%5:00:00:available:00: 4
Count for open%3:00:01::: 30
Count for open%5:00:00:unprotected:00: 11
Count for open%3:00:02::: 15
Count for open%5:00:00:vulnerable:00: 2
Count for open%2:35:00::: 16
Count for open%2:35:08::: 4
Count for open%2:41:00::: 13
Count for open%5:00:00:unrestricted:00: 4
Count for open%5:00:00:coarse:00: 2
Count for open%2:33:00::: 2
Count for open%2:35:06::: 3
Total Count: 112

Methods

We obtained the wordnet definition for all of the above senses. Following this, we obtained the BERT embeddings for each definition. We trained a binary classifier where the inputs are a (target word - definition) pair. Thus, each target-word embedding was appended to its definition

embedding. If the target word matches the given sense definition, it is a positive example (1). If the target word does not match the sense definition, it is a negative example (0).

Choosing Positive and Negative Samples

We do an 80/20 train/test split for all instances of the current word we are working with (ex. serve). We make two copies of the training data. Copy 1 contains tokens paired up with the correct sense definition. Copy 2 contains the same tokens paired up with a random sense definition. Copy 1 and Copy 2, positive and negative samples respectively, are combined and passed for training to our classifier. We evaluate on the test set, which consists of only positive samples.

Results

Results are inconclusive. The test accuracy does not converge and consistently jumps around between 0 and 1. Additionally, we attempted different types of pairings. For the sense definition, the embedding for the [CLS] was used. For the semcor sentence, we tried using both the [CLS] embedding and the target token embedding. For both of these kinds of pairings, we also tried various layers of embeddings (last, second-to-last, all three, etc). Results and accuracies remained inconsistent across all tests.

Additionally, we tried aggregating the training and testing data for each word into one large training and testing data set. We then trained one single classifier for all of the above 5 words. Results remain inconsistent.