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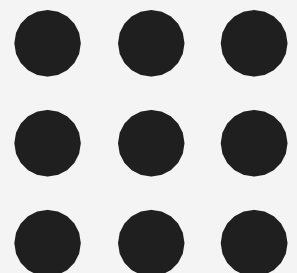
Department of Artificial Intelligence and Data Science

**Course Name – 19AD601 – Natural Language
Processing**

III Year / VI Semester

Unit 4 – SEMANTICS

Topic 4- Word Senses





Word Senses

- A sense (or word sense) is a discrete representation of one aspect of the meaning of a word.
- Loosely following lexicographic tradition, we represent each sense with a superscript: bank¹ and bank², mouse¹ and mouse². In context, it's easy to see the different meanings:
- mouse¹ : a mouse controlling a computer system in 1969.
- mouse² : a quiet animal like a mouse
- bank¹ : ...a bank can hold the investments in a custodial account ...
- bank² : ...as agriculture burgeons on the east bank, the river.



Word Senses



Defining Word Senses

- The intuition of embedding models like word2vec or GloVe is that the meaning of a word can be defined by its co-occurrences, the counts of words that often occur nearby.
- But that doesn't tell us how to define the meaning of a word sense.

Gloss

- One is based on the fact that dictionaries or thesauruses give textual definitions for each sense called glosses. Here are the glosses for two senses of bank:
 1. financial institution that accepts deposits and channels the money into lending activities
 2. sloping land (especially the slope beside a body of water)
- Glosses are not a formal meaning representation; they are just written for people.



Word Senses



The second way that thesauruses offer for defining a sense is—like the dictionary definitions—defining a sense through its relationship with other senses.

For example, the above definitions make it clear that right and left are similar kinds of lemmas that stand in some kind of alternation, or opposition, to one another.

Similarly, we can glean that red is a color and that blood is a liquid. Sense relations of this sort (IS-A, or antonymy) are explicitly listed in on-line databases like WordNet.



Relations Between Senses



Relations Between Senses

Synonymy

When the meaning of two senses of two different words (lemmas) are identical or nearly identical we say the two senses are synonyms.

Synonyms include such pairs as: couch/sofa vomit/throw up filbert/hazelnut car/automobile

A more formal definition of synonymy (between words rather than senses) is that two words are synonymous if they are substitutable one for the other in any sentence without changing the truth conditions of the sentence.

We often say in this case that the two words have the same propositional meaning.



Relations Between Senses

Antonymy

Whereas synonyms are words with identical or similar meanings, antonyms are words with an opposite meaning, like:

long/short big/little fast/slow cold/hot dark/light
rise/fall up/down in/out

Two senses can be antonyms if they define a binary opposition or are at opposite ends of some scale.

This is the case for long/short, fast/slow, or big/little, which are at opposite ends of the length or size scale.

Another group of antonyms, reversives, describe change or movement in opposite directions, such as rise/fall or up/down.



Relations Between Senses

Taxonomic Relations

Hyponym

Another way word senses can be related is taxonomically. A word (or sense) is a hyponym of another word or sense if the first is more specific, denoting a subclass of the other.

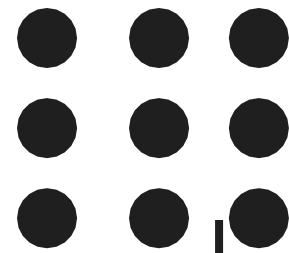
For example, car is a hyponym of vehicle, dog is a hyponym of animal, and mango is a hyponym of fruit.

Conversely, we say that vehicle is a hypernym of car, and animal is a hypernym of dog.

Superordinate

It is unfortunate that the two words (hypernym and hyponym) are very similar and hence easily confused; for this reason, the word superordinate is often used instead of hypernym.

Superordinate	vehicle	fruit	furniture	mammal
Subordinate	car	mango	chair	dog



Relations Between Senses

Meronymy

Another common relation is meronymy, the part-whole relation. A leg is part of a chair; a wheel is part of a car. We say that wheel is a meronym of car, and car is a holonym of wheel.

Structured Polysemy

The senses of a word can also be related semantically, in which case we call the structured relationship between them structured polysemy. Consider this sense bank:

(18.11) The bank is on the corner of Nassau and Witherspoon.

This sense, perhaps bank, means something like “the building belonging to a financial institution”. These two kinds of senses (an organization and the building associated with an organization) occur together for many other words as well (school, university, hospital, etc.).

Thus, there is a systematic relationship between senses that we might represent as
BUILDING → ORGANIZATION.

This particular subtype of polysemy relation is called metonymy. Metonymy is the use of one aspect of a concept or entity to refer to other aspects of the entity or to the entity itself.



THANK YOU