Natural Language Processing

Module 4: Semantic Analysis

Dr. Rahul S. Khokale

HoD Computer Engineering

St. John College of Engineering & Management, Palghar

- **Lexical Semantics** : A richer model of the semantics of words, drawing on the linguistic study of word meaning, a field called **lexical semantics.**

- **Lexeme :** A word lexeme means a pairing of particular form (orthographic or phonological) with its meaning.

- **Lexicon:** A lexicon is a finite list of lexemes

- **Lemma**: A Lemma or citation form is the grammatical form that is used to represent a lexeme.

Relations among lexemes & their senses

- Homonymy
- Polysemy
- Metonymy
- Synonymy
- Antonymy
- Hyponymy

Homonymy

If different senses of a word may not have any particular relation between them then this relation between the senses is called one of homonymy.

e.g. Thus **bank1** ('financial institution') and **bank2** ('sloping mound') are homonyms.

Polysemy

When two senses are related semantically, we call the relationship between them **Polysemy** rather than homonymy.

for e.g. Consider the words

bank3 *blood bank, sperm bank* and *egg bank.*

These three words are not related to 'sloping mound' but, they are biological repositories.

The relationship between **bank1** and **bank3** is **polysemy**

Metonymy

- The bank is on the corner of bus station and mall. This sense, which we call **bank4,** means something like **'the building belonging** to a financial institution'.

- It turns out that 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 often called **metonymy.**

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. Thus we are performing metonymy when we use the phrase *the White House to refer to the administration whose office is in the White House.*

Metonymy

Other common examples of metonymy include the relation between the following pairings of senses:

- **Author** (*Jane Austen wrote Emma*) □□**Works of Author** (*I really love Jane Austen*)
- **Animal** (*The chicken was domesticated in Asia*)□□**Meat** (*The chicken was overcooked*)
- **Tree** (*Plums have beautiful blossoms*) □□ **Fruit** (*I ate a preserved plum yesterday*)

Synonymy

- Synonyms are words with identical or similar meanings.
- When the meaning of two senses of two different words (lemmas) are identical or nearly identical we say the two senses are **synonyms.**
- e.g. *couch/sofa, vomit/throw up and car/automobile*

Antonymy

- Words with opposite meaning are called antonyms.
  Such as the following:

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

- It is difficult to give a formal definition of antonymy.

- 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 groups of antonyms is **reversives,** which describe some sort of change or movement in opposite directions, such as *rise/fall or up/down.*

Hyponymy

- One sense is a **hyponym** of another sense if the first sense 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 can say that *vehicle is a* **hypernym** of *car, and animal is a* **hypernym** of *dog.*

- 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*
hyponym	*car*	*mango*	*chair*	*dog*

Quiz

Solve following Multiple Choice Questions (MCQs). Each question carries equal marks   (10 X 1 =10)

Q.1) Semantic analysis deals with ……………. of a sentence

    a) Meaning   b) Syntax   c) Parsing   d) Translation

Q.2) A pairing of particular form (orthographic or phonological) with its meaning called………..

    a) Sting   b) Lexeme   c) Lexicon   d) Non of these

Q. 3) A finite list of lexemes is……………..

    a) symbol   c) lexeme   c) lexicon   d) lemma

Q 4) If different senses of a word may not have any particular relation between them then this relation between the senses is called…

    a) Synonymy b) antonymy   c) polysemy d) homonymy

Q 5) When two senses are related semantically, we call the relationship between them is called……

    a) polysemy   b) homonymy c) hyponymy   d) metonymy

Q.6) A particular subtype of polysemy relation is often called…….

a) homonymy   b) Synonymy   c) Metonymy   d) hyponymy

Q.7) …….is the use of one aspect of a concept or entity to refer to other aspects of the entity, or to the entity itself.

a) metonymy   b) homonymy   c) hyponymy   d) Non of these

Q. 8) Words with identical or similar meanings are called……………

a) homonymy   c) polysemy   c) antonyms d) synonyms

Q 9) Words with opposite meaning are called ……..

a) Synonymy b) antonymy   c) polysemy d) homonymy

Q 10) One sense is a ………..of another sense if the first sense is more specific, denoting a subclass of the other

a) polysemy   b) homonymy c) hyponymy   d) metonymy