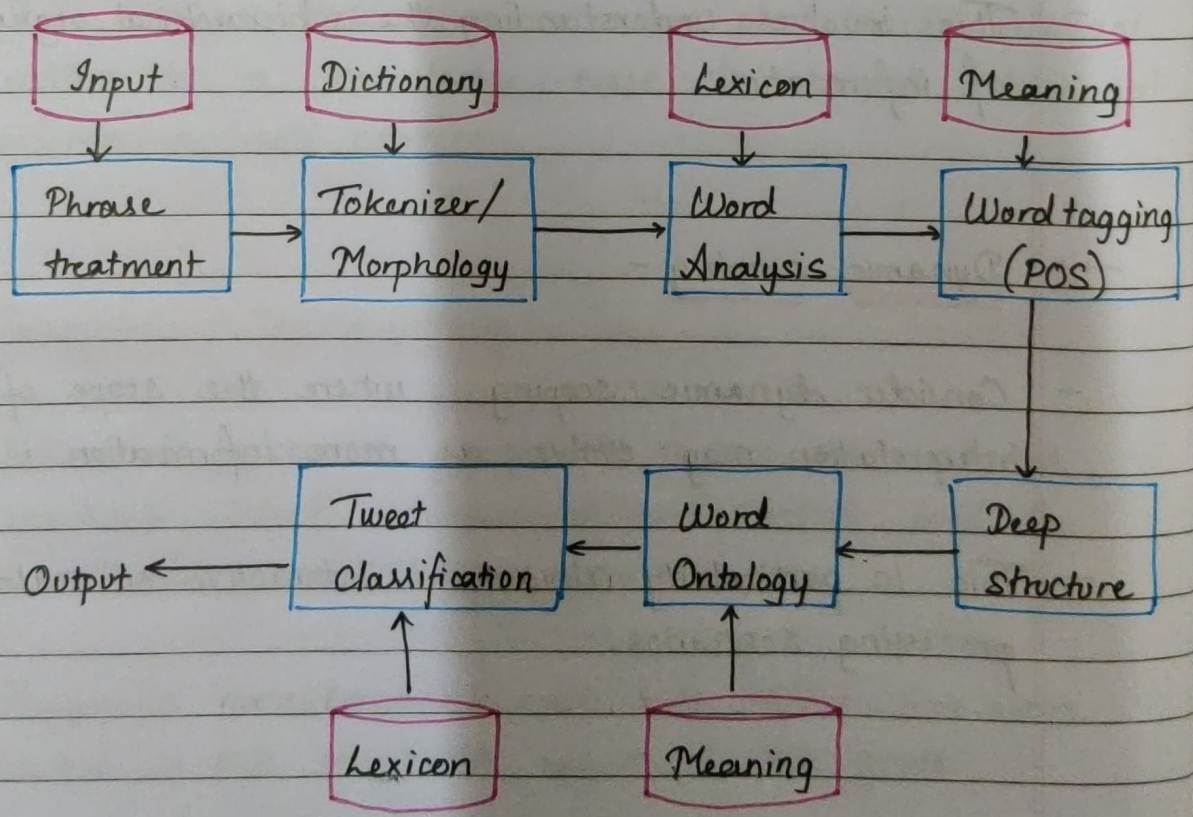
Q7. Semantic analysis

- Semantic analysis starts with lexical semantics, which studies individual words' meanings (ie. dictionary definitions)

- Semantic analysis then determines relationships between individual words and analyses the meaning of words that come together to form a sentence.

eg. "the boy ate the apple" defines apple as a fruit.
"the boy went to Apple" defines apple as a brand or store

- Typical semantic interpretion pipeline →



- Critical elements of semantic analysis →

The critical elements of semantic analysis are fundamental to processing the natural language:

→ Hyponyms: Hyponyms are entities that have a relationship with a more general verbal entity called hypernym
eg. "red", "blue", and "green" are all hyponyms of "colour", their hypernym.

→ Meronomy: Refers to words and text that denote a minor ~~part~~ of component of something
eg. mango is a meronomy of a mango tree.

→ Polysemy: It refers to words that have different meanings, represented under the same entry.
eg. "dish" can refer to a meal or a plate.

→ Synonyms: This refers to words with similar meanings

eg. "abstract", "summary" and "synopsis" are all synonyms.

→ Antonyms: This refers to words with opposite meanings.

eg. "cold" has antonyms "warm" and "hot".

→ Homonyms: Refer to words with the same spelling and pronunciation, but have different meanings altogether.

eg. bark (tree) and bark (dog)

- Semantic analysis brings entities, concepts and relationships together to provide more context to language so machines can understand text with more accuracy

- Semantic analysis derives meaning from language and helps machines interpret meaning

- Semantic analysis uses two distinct techniques to obtain information from text or a corpus of data-

1. Semantic classification →

- Text classification where predefined categories are assigned to the text for faster task completion

- The various types of text classification under semantic analysis include →

i. Topic classification - This classifies the text into predefined categories based on content type.

ii. Sentiment analysis - It is used by various social media platforms like Twitter, Facebook, Instagram and others to detect positive, negative or neutral emotions hidden in texts (posts/stories). Sentiment analysis helps brands identify dissatisfied customers or a hint on what customers feel about the brand as a whole.

iii. Intent classification - It refers to the classification of text based on what the customers intend to do next. You can use it to tag customers as 'interested' or 'not interested' to effectively reach out to the customers who may intend to buy a product or show inclination towards buying it.

2. Semantic extraction →

- Semantic extraction refers to extracting or pulling out specific data from the text
- Extraction types include →

i. Keyword extraction - Helps identify relevant terms and expressions in the text and gives deep insights when combined with the above classification techniques.

ii. Entity extraction - It is used to identify entities and extract entities in text, such as the names of individuals, organizations, places etc.

Ambiguity Resolution:-

Ambiguity Resolution in natural language Processing refers to the process of disambiguating or resolving multiple possible meanings or interpretations [meaning of something].

* ambiguity occurs when a Phrase or sentence can be interpreted in multiple ways. This can be due to unclear or multiple meanings of words, Phrases or syntax.

* Ambiguity Resolution is the process of clarifying the meaning of ambignous language or statements

* Ambiguity has various types, and each requires different strategies for resolution.

There are some common types of ambiguity in NLP and methods used for resolution:

→ Lexical Ambiguity
→ Syntactic Ambiguity
→ Semantic Ambiguity
→ Referential Ambiguity
→ Anaphoric Ambiguity.

Lexical Ambiguity:-

Lexical Ambiguity, this occurs when a word has multiple meanings. like homonyms, Polysemes can be lead to ambiguity.

→ Contextual information is often used to disambiguate

Ex:- The bank is steep → hill, mountain, street

"bank" is referring to a financial institution or the side of river.

Resolution:- Adding extra information to the sentence (flowing water (or) financial statement)

2. Syntactic Ambiguity:-

This occurs when the structure or grammar of a sentence allows for multiple interpretations.

Ex:- I saw a man with the telescope.

Ambiguity in sentence is:-

Did I use a telescope to see the man, or was the man holding a telescope?

Resolution:-

Adding Punctuation or rephrasing helps.

"I saw a man, with the telescope".

3. Semantic Ambiguity:-

Semantic Ambiguity which arises when a word or phrase has different meanings based on the context.

Ex:- Tejesh and Teju went to the bank.

ambiguity

=) They went to financial institution

=) They went to the side of a river.

Resolution:-

Contextual information or additional details in the surroundings sentences would help

4. Referential Ambiguity:-

Referential Ambiguity arises when a reference (ex:- a name) could apply to multiple entities.

~~Ex:- I saw Tom at the party, and he was dancing~~

Ex:- Mary showed Vyshu her new Painting.

Possible meanings:-

Mary showed Vyshu Mary's new Painting.

Mary showed Vyshu Vyshu's new Painting.

Resolution:- The Possessive Pronoun "her" is ambiguous, additional information is need to clarify.

5. Anaphoric Ambiguity:-

It is similar to the Referential Ambiguity, occurs when a Pronoun or expression refers to more than one possible antecedent [Place, Person, a thing]

Ex:-

Niki bought a new dress. She wore it to the Party

Resolution:-

knowledge of the antecedents.