Introduction to Text Processing:

Text processing is the analysis and organization of unstructured text data to extract meaningful insights. It is a key part of Natural Language Processing (NLP), a field of AI that helps computers understand and generate human language. Text from emails, social media, and reviews needs cleaning and preprocessing before it can be used in AI models.

Why Text Processing is Important:

Text processing helps businesses analyze large amounts of unstructured data, revealing customer behaviors, opinions, and interactions. Apps like Alexa, Siri, and Google Assistant use it without users knowing. Efficient text processing is key to improving customer experiences and making data-driven decisions.

Key Methods in Text Processing:

Text processing uses several techniques to analyze text data:

- Word Frequency: Finds the most common words, highlighting key themes.

- Collocation: Identifies words that often appear together (e.g., "customer service").

- Concordance: Examines how words are used in different contexts.

- TF-IDF: Measures a word's importance in a document.

- Text Summarization: Creates concise summaries from complex texts.

- Topic Modeling: Groups related words to uncover themes.

- Text Classification: Categorizes text for tasks like sentiment analysis.

- Keyword Extraction: Extracts important keywords for better insights.

- Lemmatization and Stemming: Reduces words to their root forms for consistency.

Text Processing Use Cases:

1 Customer Feedback Analysis:
Analyzes reviews and surveys to uncover insights into satisfaction, issues, and areas for improvement.

2 Customer Service Automation:
Automates tasks like ticket categorization, routing, and prioritization to improve efficiency and response times.

3 Product Reviews Analysis:
Helps companies analyze customer sentiments on product features, pricing, and design to guide future development.

Text processing helps businesses analyze large amounts of unstructured text data. Using techniques like word frequency, sentiment analysis, and classification, companies gain insights to improve products, services, and customer experiences. It's key to modern NLP, enabling automation, better decisions, and personalized customer interactions.

NLTK (Natural Language Toolkit) is a Python library that helps you work with text. It provides tools to break text into words or sentences, identify parts of speech, translate, analyze sentiment, and more.

Text Mining

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World Cloud

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Term Document

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Data Processing

Introduction to NLP and spaCy:

Natural Language Processing (NLP) is a field of AI focused on enabling computers to understand, interpret, and generate human language. It involves tasks like text classification, sentiment analysis, and language translation.

spaCy is an open-source NLP library designed for fast, efficient text processing. It offers pre-trained models for tasks like tokenization, named entity recognition, and part-of-speech tagging. spaCy is widely used for building production-ready NLP applications due to its speed and scalability.

To install spaCy:

-pip install spacy

-python -m spacy download en_core_web_sm

Sentence Detection in spaCy refers to identifying sentence boundaries within text.

-How it works:
spaCy uses its trained models to split text into individual sentences.

-Accessing Sentences:
After processing the text into a Doc object, you can access sentences using the `.sents` attribute.

Tokens in spaCy are individual units of text, such as words, punctuation, or spaces, that are processed and analyzed.

-How it works:
When you process text with spaCy, it breaks the text into tokens (e.g., words(words convert into small letter), punctuation(remove special character . , @ !), numbers(remove numbers).

-Accessing Tokens:
Tokens are stored in the Doc object, and you can access them by iterating through the Doc or using attributes like `.text`, `.lemma_`, `.pos_` (part of speech), and `.dep_` (syntactic dependency).

Stop Words are common words (like the,and,is,it,a) which word have no meaning or emotions that will remove.

-spaCy and Stop Words:
spaCy includes a predefined list of stop words. You can check if a token is a stop word using `.is_stop`.

Lemmatization means converting a word into root words with meaning.

-Example:
running becomes run, better becomes good.

-How spaCy does it:
After processing text, you can access the lemmatized form of each token using `.lemma_`.

Word Frequency is the process of counting how often each word appears in a text.

-Purpose:
It helps identify important words or trends in the text, highlighting key themes or frequent topics.

-How it works:
You can count the frequency of each token (word) in a document and analyze them for insights.

Part-of-Speech (POS) Tagging is the process of labeling each word in a sentence with its grammatical category, like noun, verb, adjective, etc.

-Purpose:
It helps understand the structure and meaning of a sentence by identifying the role of each word.

-How spaCy does it:
After processing text, spaCy assigns a POS tag to each token, which can be accessed using `.pos_` or `.tag_`.

displaCy is a visualization tool in spaCy for rendering linguistic annotations, such as syntactic dependencies and named entities, in a browser.

-Purpose:
It helps visualize and interpret NLP results like sentence structure, word dependencies, and entity recognition.

-How to use:
You can visualize dependency trees and named entities by calling `displaCy.render()`.

Preprocessing Functions in NLP are techniques used to clean and prepare text data before analysis. They help improve the accuracy of models by standardizing and simplifying the text.

1 Lowercase - means all text convert into lowercase eg- Hello becomes hello.

2 Removing Punctuation - remove special character like (. , @ !).

3 Removing StopWords - (is, it, the, a, like) words which have no meaning or emotions that will remove.

4 Tokenization - Sentence tokenizer means paragraph convert into sentence.

Word tokenizer means sentence convert into word.

5 Lemmatization/Stemming - means converting a word into root word with meaning

eg-plays becomes play, running becomes run.

6 Removing Numbers - Deletes numerical values that are not relevant to the analysis.

7 Removing Extra Spaces - Cleans up unnecessary spaces in the text.

Rule-Based Matching - in spaCy allows you to find patterns in text using custom rules, without training a model. You can match specific words, phrases, or structures using patterns.

-How it works:
You define patterns using token attributes like text, part-of-speech, and lemma. spaCy's `Matcher` or `PhraseMatcher` applies these rules to find matches in the text.

Dependency Parsing in spaCy - analyzes the grammatical structure of a sentence, identifying how words are related to each other. It shows the syntactic relationships between words (like subject, object, verb).

-How it works:
After processing the text, spaCy assigns each word a syntactic label (e.g., subject, object) and a dependency relation. You can access these relationships with `.dep_` (dependency label) and `.head` (the governing word).

Tree and Subtree Navigation - in spaCy refers to navigating the syntactic structure (dependency tree) of a sentence to analyze relationships between words.

Tree Navigation - You can access the root word (head) and navigate the entire dependency tree of a sentence, which shows how each word connects to others.

Subtree Navigation - You can extract subtrees (connected words) that share a common dependency. A subtree is a part of the tree where words are related to a specific word.

Shallow parsing - also known as chunking, is the process of dividing text into smaller, meaningful units called "chunks" (e.g., noun phrases, verb phrases). Unlike full parsing, it doesn't analyze the entire sentence structure but focuses on identifying these chunks, which helps with tasks like information extraction and part-of-speech tagging.

Named-Entity Recognition (NER) - is a process in Natural Language Processing (NLP) that identifies and classifies proper names in text, such as people, organizations, locations, dates, and other specific entities. For example, in the sentence "Apple was founded by Steve Jobs in California," NER would identify "Apple" as an organization, "Steve Jobs" as a person, and "California" as a location.

- Use spaCy for Natural Language Processing (NLP).

- Customize spaCy's built-in features.

- Analyze text statistically.

- Build a pipeline to process unstructured text.

- Parse sentences and extract insights.