* Natural language Processing *

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* NLP:

Natural language processing is a subfield of linguistics, computer science and artificial intelligence concerned with the interactions between computers and human language, In a particular how to program computers to process and analyze large amounts of natural language data.

* Need for NLP:

In neuropsychology, linguistics and philosophy of language, a natural language or ordinary language is any language that has evolved naturally in human through use and repetition without conscious planning or premeditation.

Natural languages can take different forms such as speech or signing. They can distinguished from constructed and formal languages such as those used to program computers or to study logic.

* Applications:

i. Contextual Advertisements
ii. Email Clients - Spam filtering, smart reply
iii. Social media - removing adult content, Opinion mining
iv. Search Engines
v. Chatbots

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* Common NLP Tasks:

1. Text / Document Classification
2. Sentiment Analysis
3. Language Detection and Machine Translation
4. Conversational agents
5. Knowledge Graph and QA Systems
6. Text Summarization
7. Topic Modelling
8. Text Generation
9. Spell Checking and Grammar Correction
10. Text Parsing
11. Speech to Text

* Approaches To NLP:

1. Heuristic Method
2. Machine Learning Based method
3. Deep Learning Based Methods.

1. Heuristic Approaches:

A heuristic is any approach to problem solving that employs a pragmatic method that is not fully optimized, perfected and rationalized but is nevertheless "good enough" as an approximation or attribute substitution.

examples: Regular expressions
Wordnet
Open mind Common Sense.

2. Machine learning Approach

The Big Advantages:
Used for open-ended problem in NLP.

ML Workflow:
Converts textual Data into numbers or vectors.

Algorithm Used:
↳ 1. Naive Bayes
2. Logistic Regression
3. SVM
4. LDA (Topic Modelling)
5. Hidden Markov models.

3. Deep learning Approach

Big Advantages:
1. Retains Sequential information of Sentences.
2. Feature Generation is Automatic.

Architectures:
↳ 1. RNN (Sequential / Time Series Data)
2. LSTM (Understand long Sentences)
3. GRU / CNN
4. Transformers
5. Auto encoders.

* Challenges in NLP:

1. Ambiguity:
I saw the boy on beach with my binoculars.
I have never tasted a cake quite like that one before.

2. Contextual Words
I ran to the store because we ran out of milk.

3. Colloquialisms and Slang
Piece of cake, pulling your leg.

4. Synonyms

5. Irony, Sarcasm and tonal difference
That's just what I needed today!

6. Spelling Errors.

7. Creativity
Poems, dialogue, scripts

8. Diversity