

Introduction to NLP

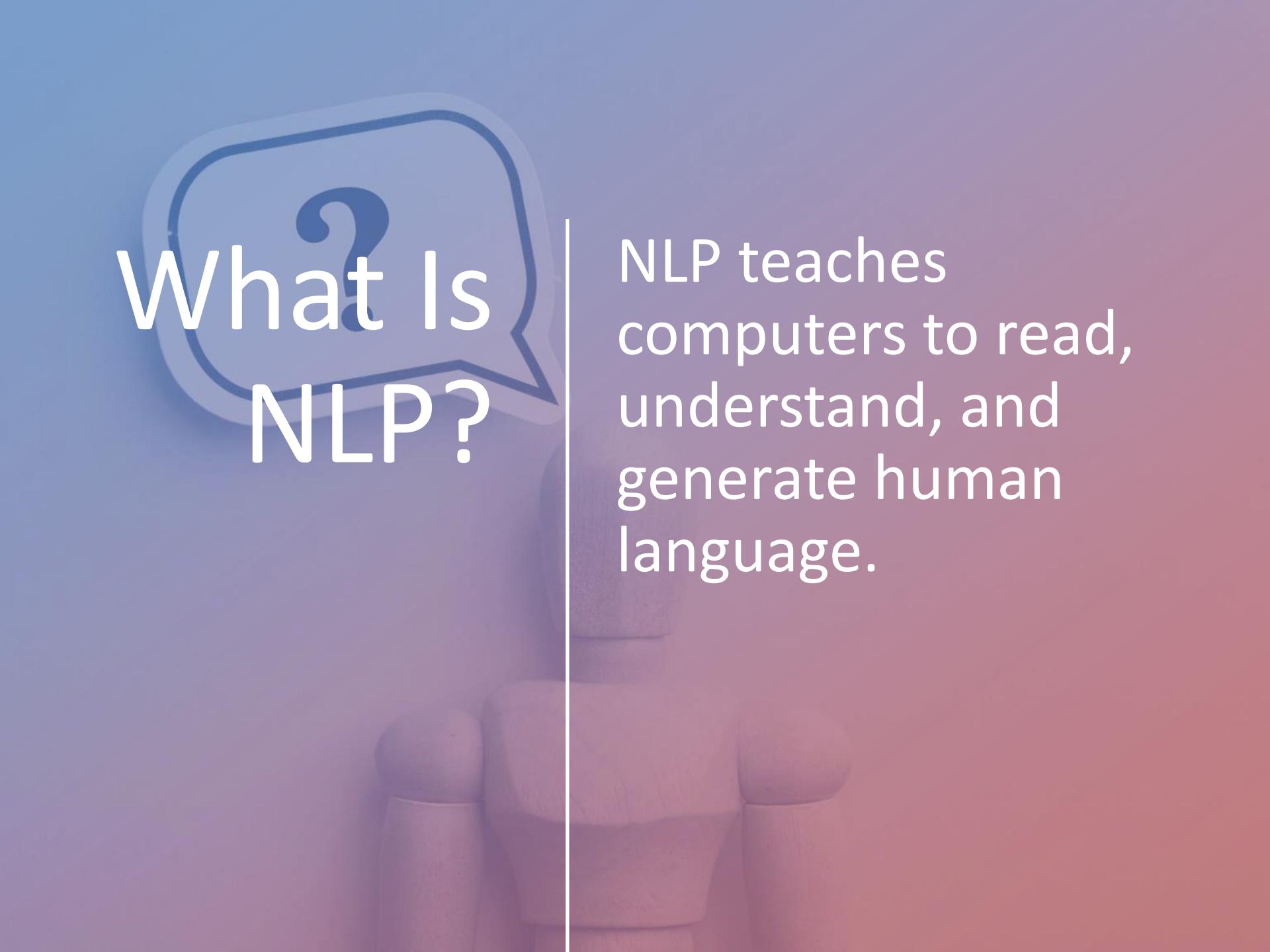
- How Machines Learn to Understand Human Language
- From words to meaning



What Is Language?

Language is more than words.

It expresses thoughts, emotions, and intentions.

A hand is pointing upwards towards the text. A large, semi-transparent blue speech bubble is positioned above the text, containing a white question mark.

What Is NLP?

NLP teaches computers to read, understand, and generate human language.

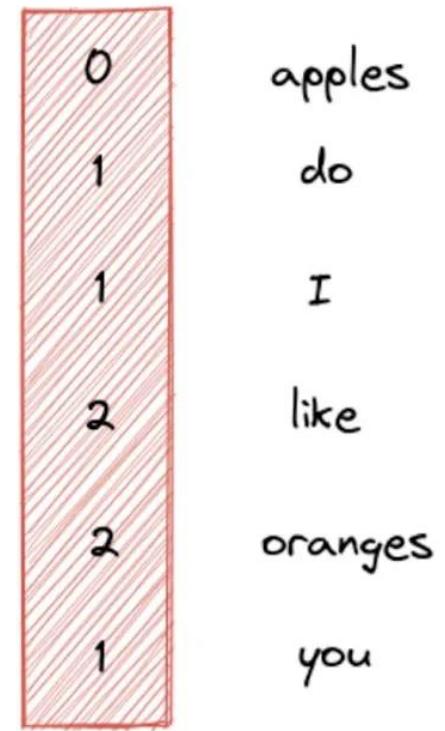
Why Is NLP Hard?

Computers see numbers, humans see meaning.

"I like oranges, do you like oranges?"



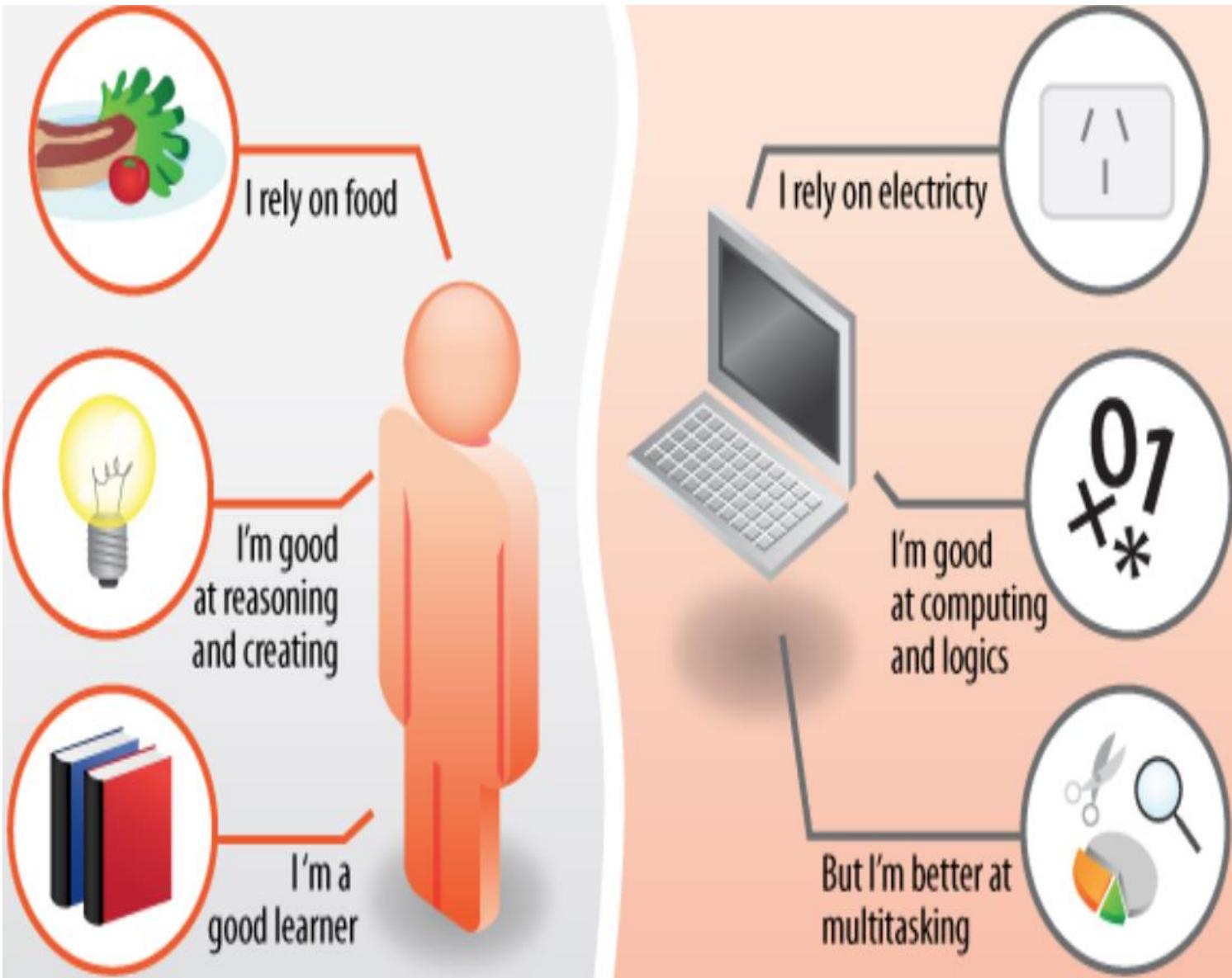
Bow text vector



Humans vs Machines

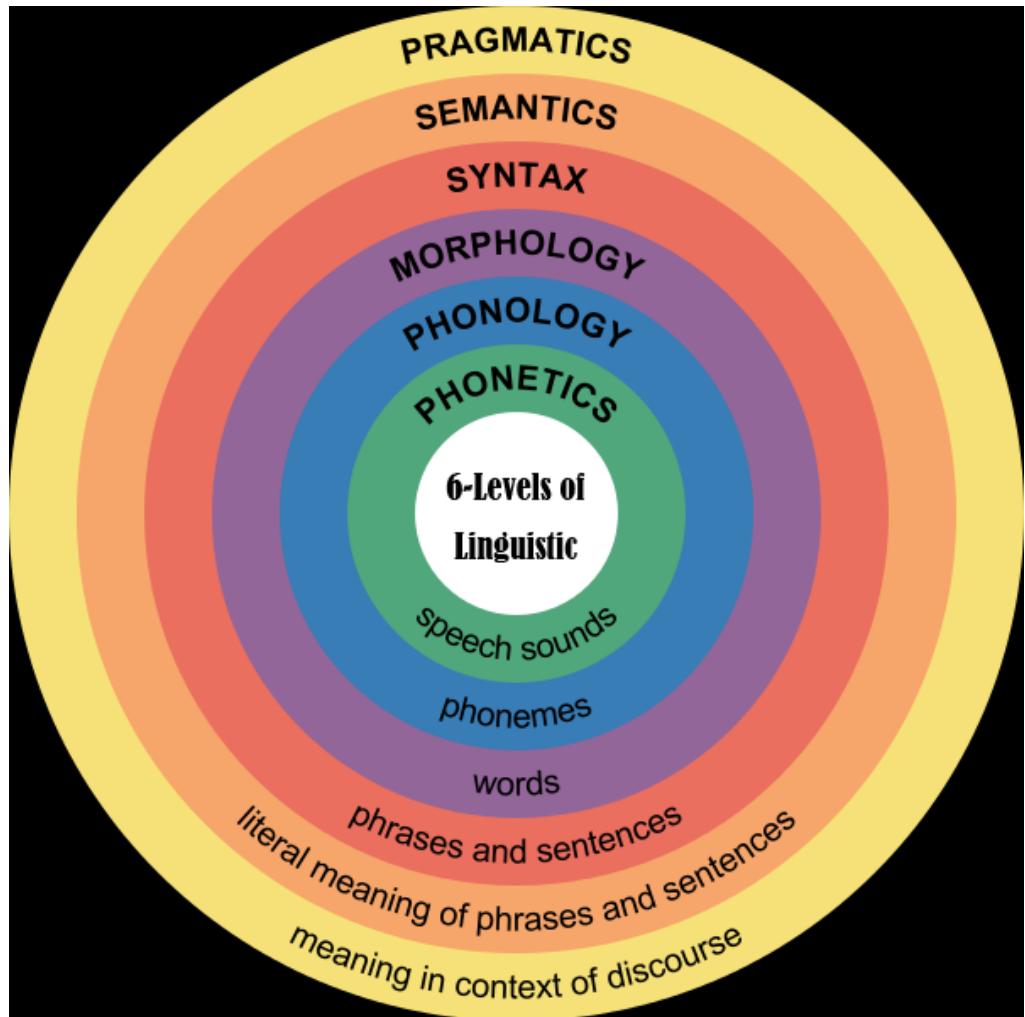
Humans
understand
context.

Machines
learn patterns.



Layers of Language

- Words → Structure → Meaning
→ Context



Deep Meaning Example

“Can you open the window?”

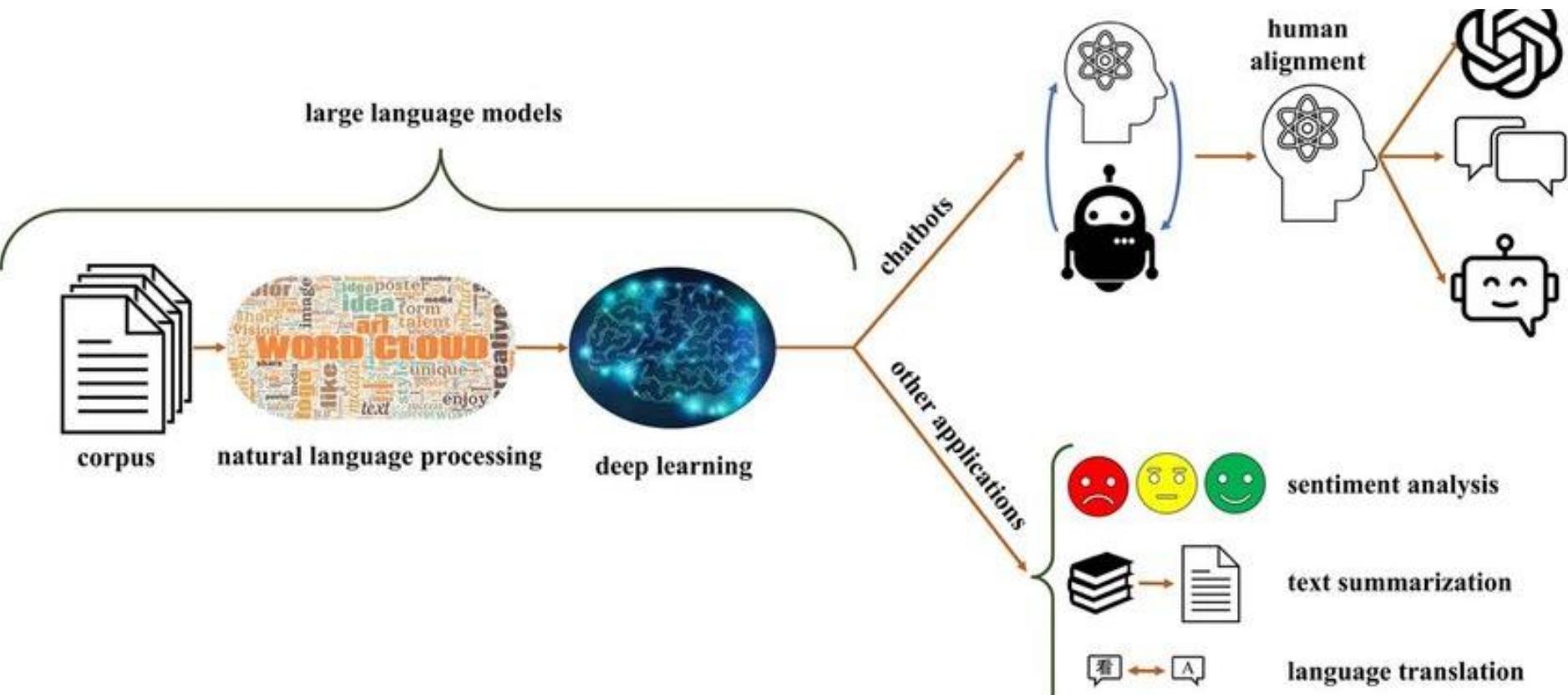
Request, not a question.

Early NLP

Rule-based systems failed
due to language complexity.

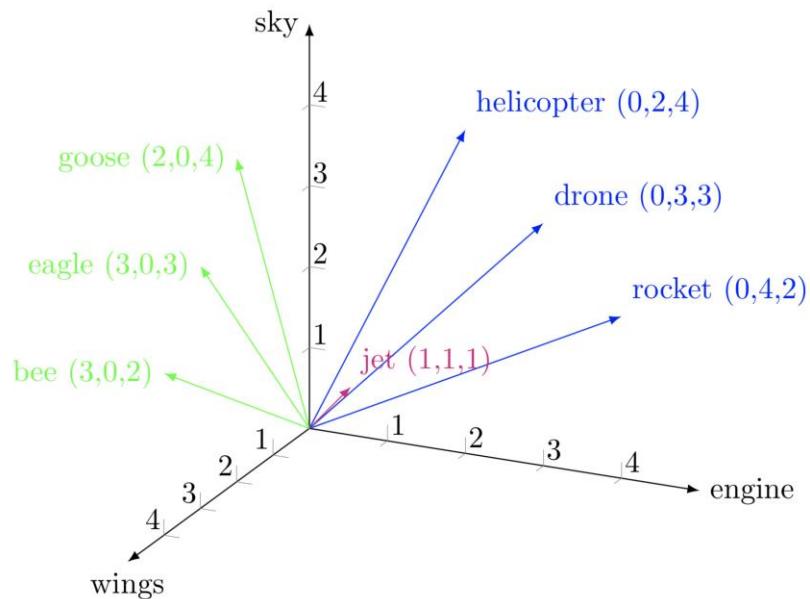
Modern NLP

- Machines learn language from large data.



Words as Numbers

- Word embeddings represent meaning numerically.

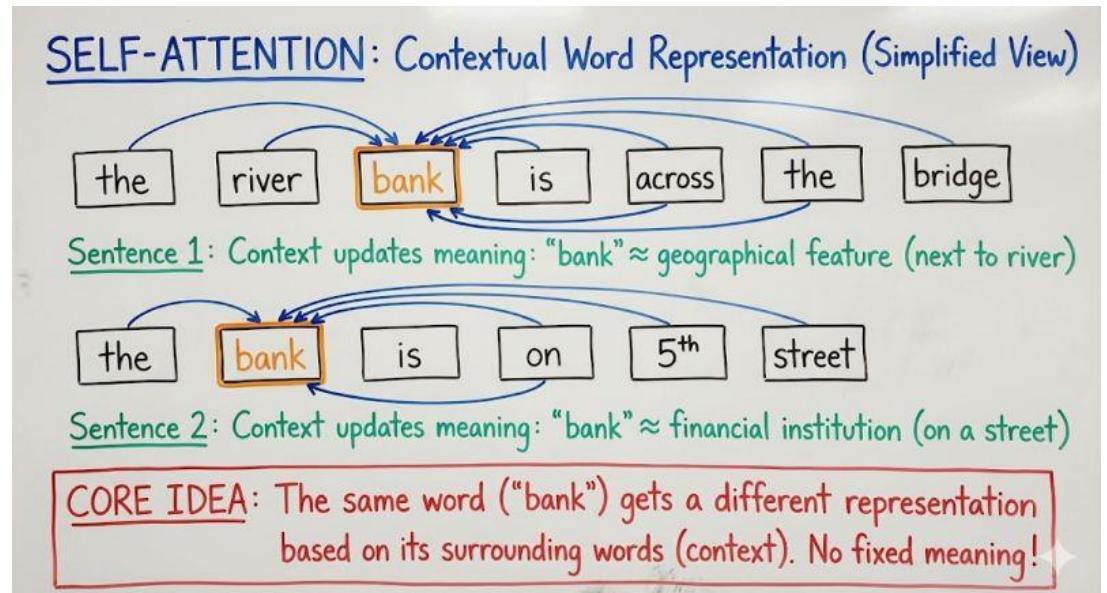


Sentence: Word embedding represents a word as numerical data.

| | |
|------------|--------------------|
| word | [1, 0, 0, 0, 0, 0] |
| embedding | [0, 1, 0, 0, 0, 0] |
| represents | [0, 0, 1, 0, 0, 0] |
| a | [0, 0, 0, 1, 0, 0] |
| as | [0, 0, 0, 0, 1, 0] |
| numerical | [0, 0, 0, 0, 0, 1] |
| data | [0, 0, 0, 0, 0, 1] |

Context Matters

- Same word, different meaning in context.



Deep Learning

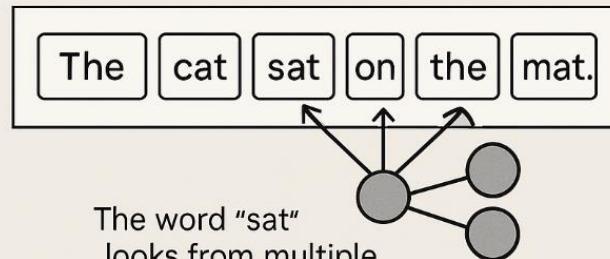
- Attention helps models focus on important words.

Self-Attention



The word "sat" looks at every other word to understand itself better

Multi-Head Attention



The word "sat" looks from multiple perspectives at once

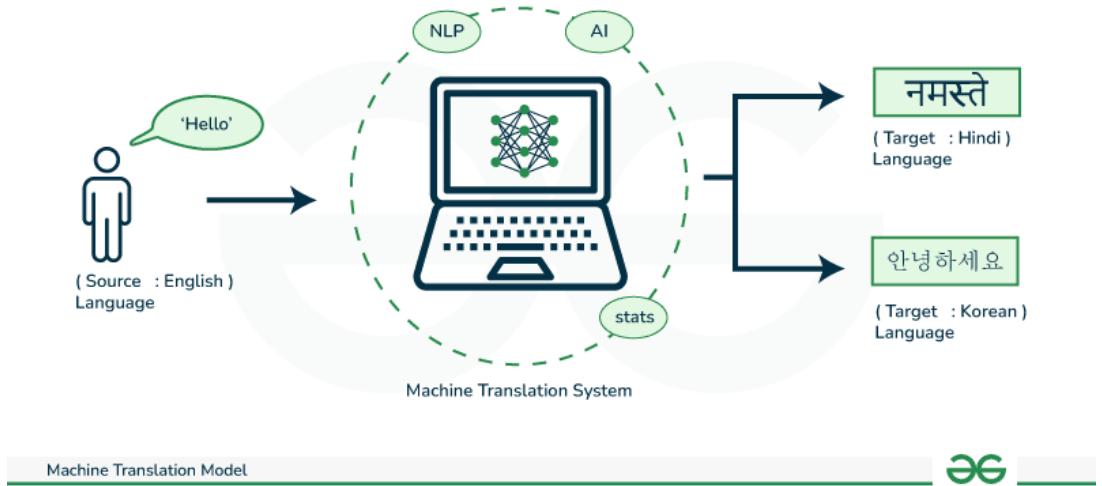
Masked Attention



The word „mat“ is not allowed to peek at future words

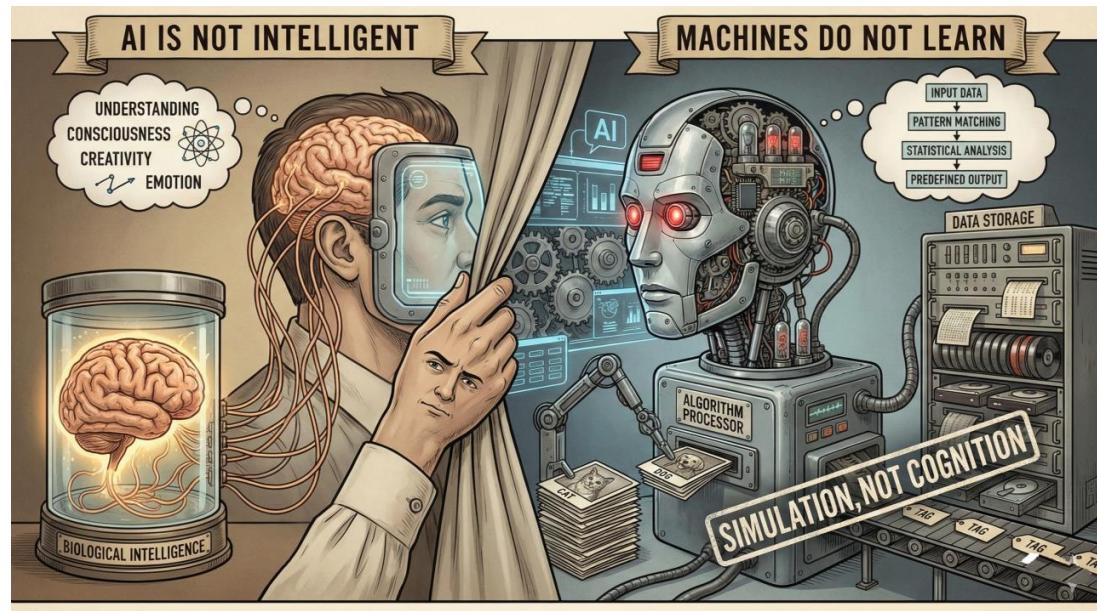
NLP Applications

- Chatbots,
Translation, Search,
Sentiment Analysis.



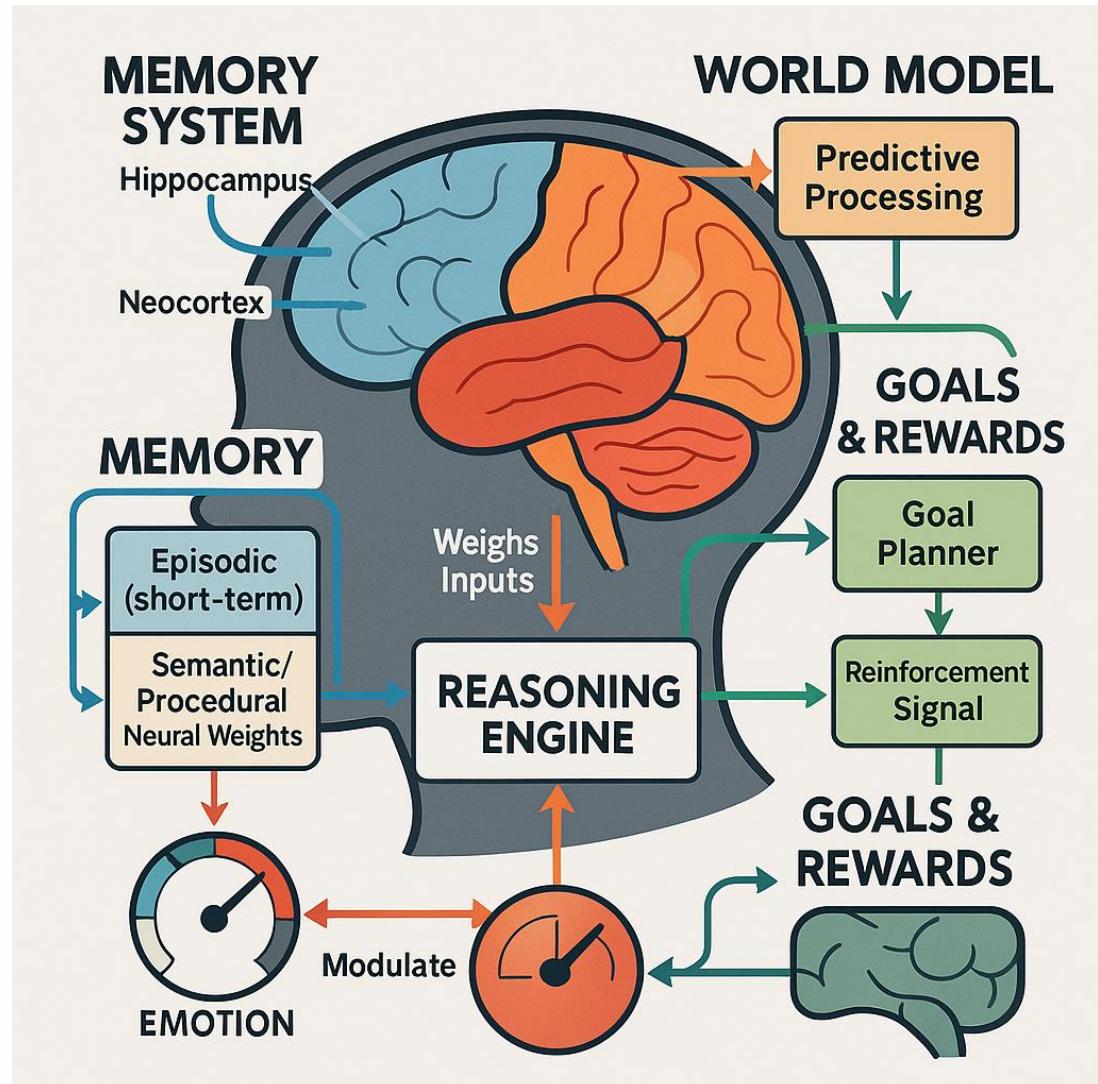
Key Insight

- NLP models patterns of understanding, not consciousness.



Why Learn NLP?

- Language is core to AI and human intelligence.



Course Roadmap

- From words → meaning → intelligence



Thank you !

