

# 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.



# 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?" →

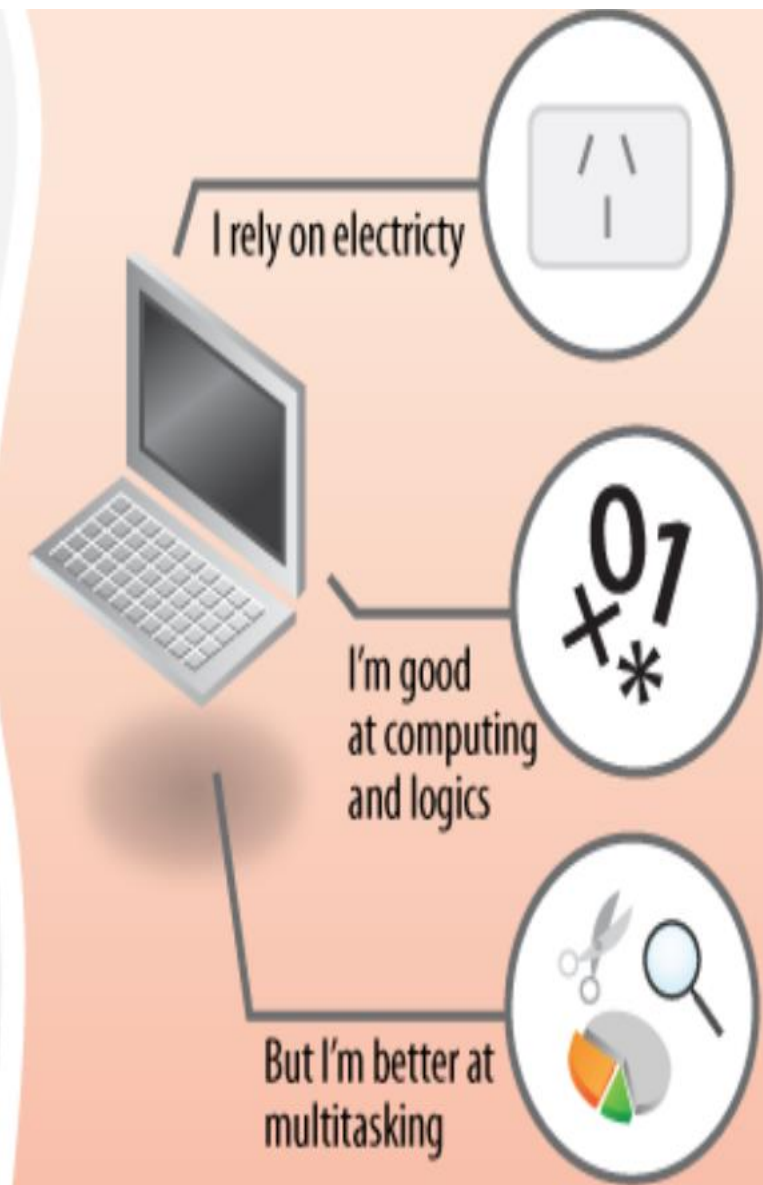
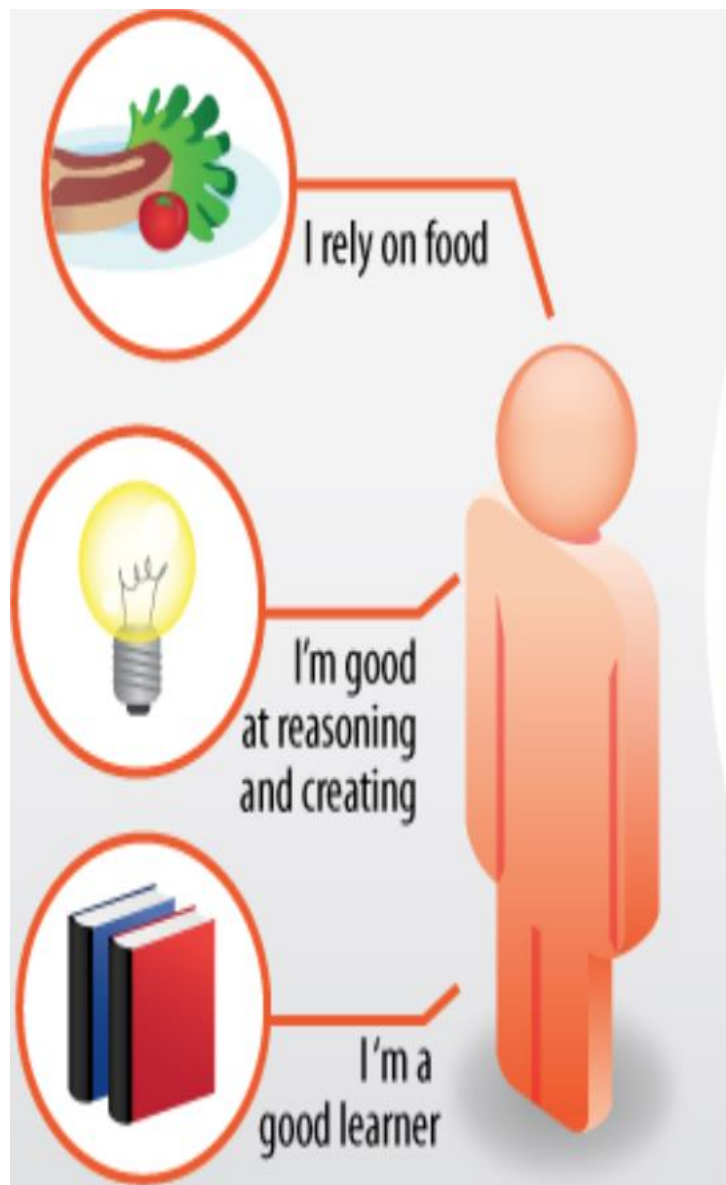
Bow text vector

0	apples
1	do
1	I
2	like
2	oranges
1	you

# Humans vs Machines

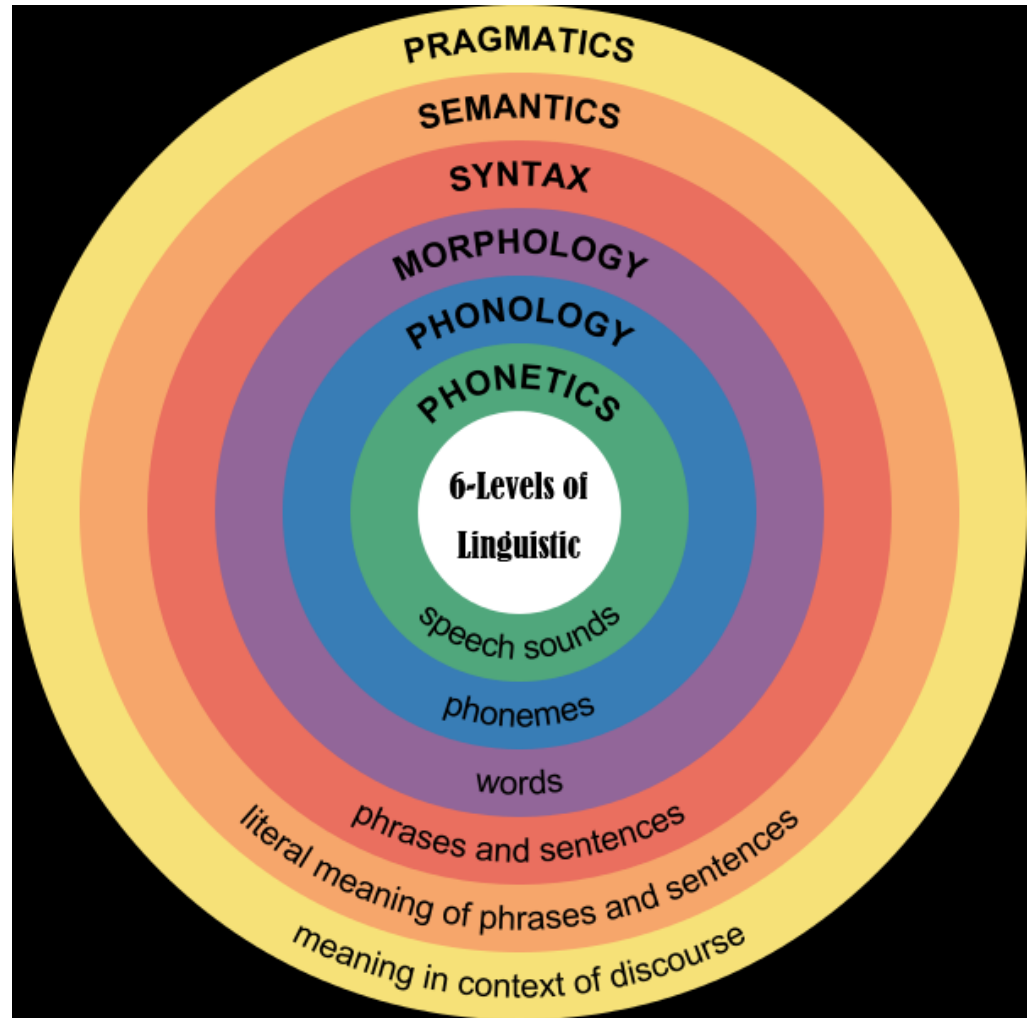
Humans  
understand  
context.

Machines  
learn patterns.



# Layers of Language

- Words → Structure → Meaning → Context



# Deep Meaning Example

“Can you open the window?”

Request, not a question.

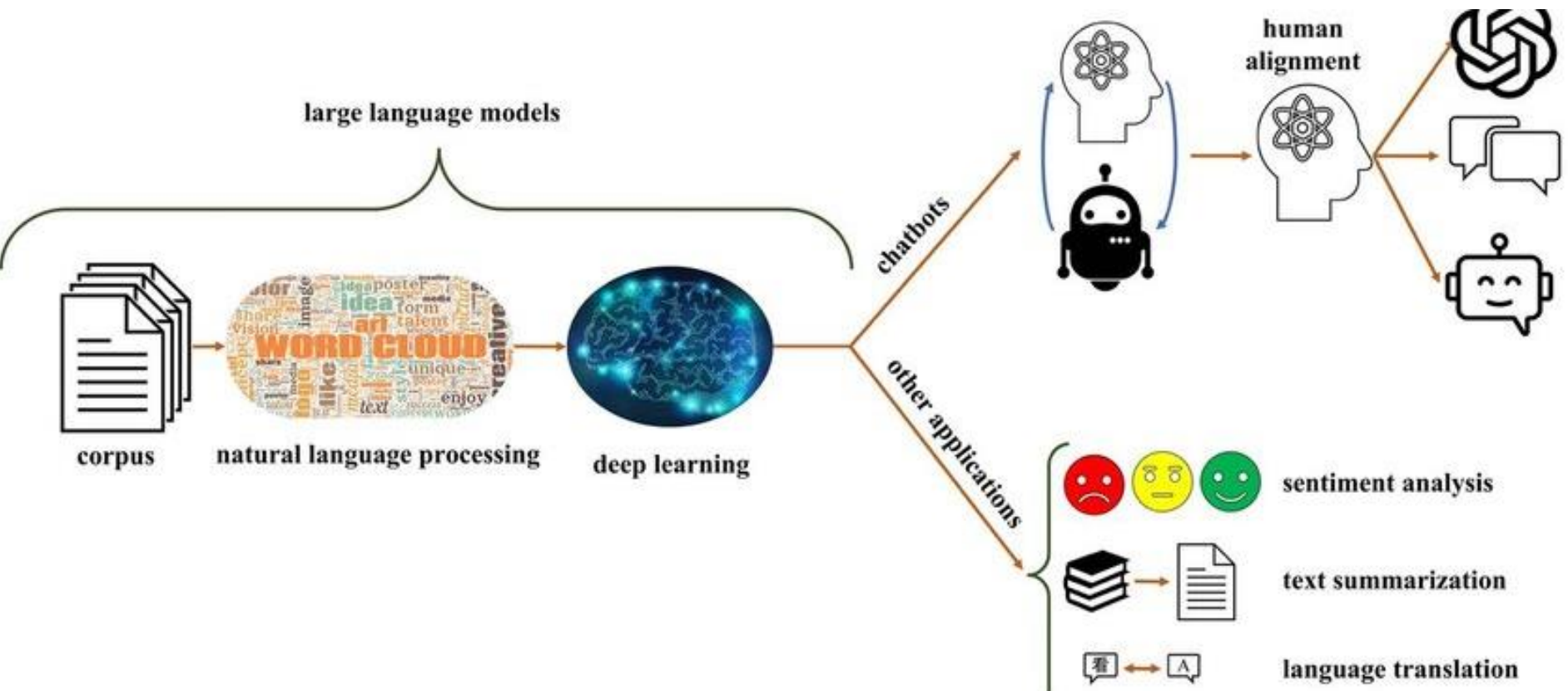


# Early NLP

Rule-based systems failed  
due to language complexity.

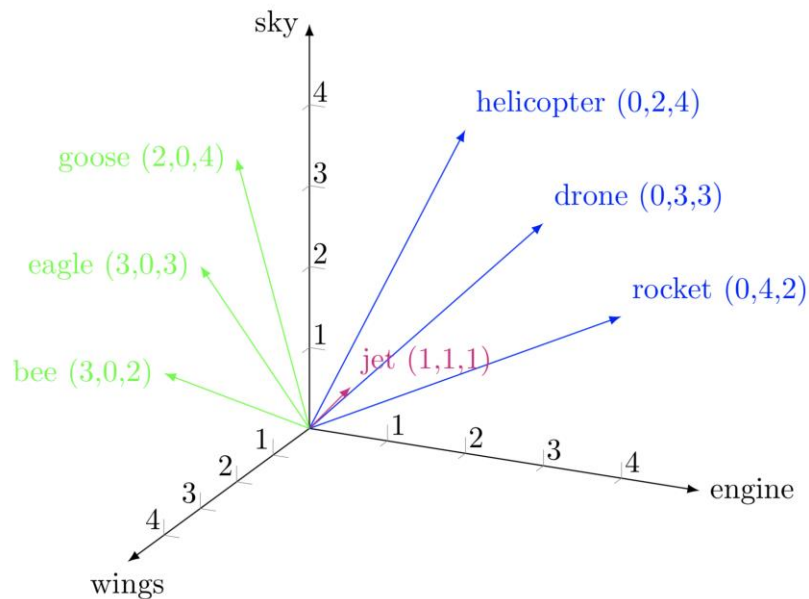
# Modern NLP

- Machines learn language from large data.



# Words as Numbers

- Word embeddings represent meaning numerically.

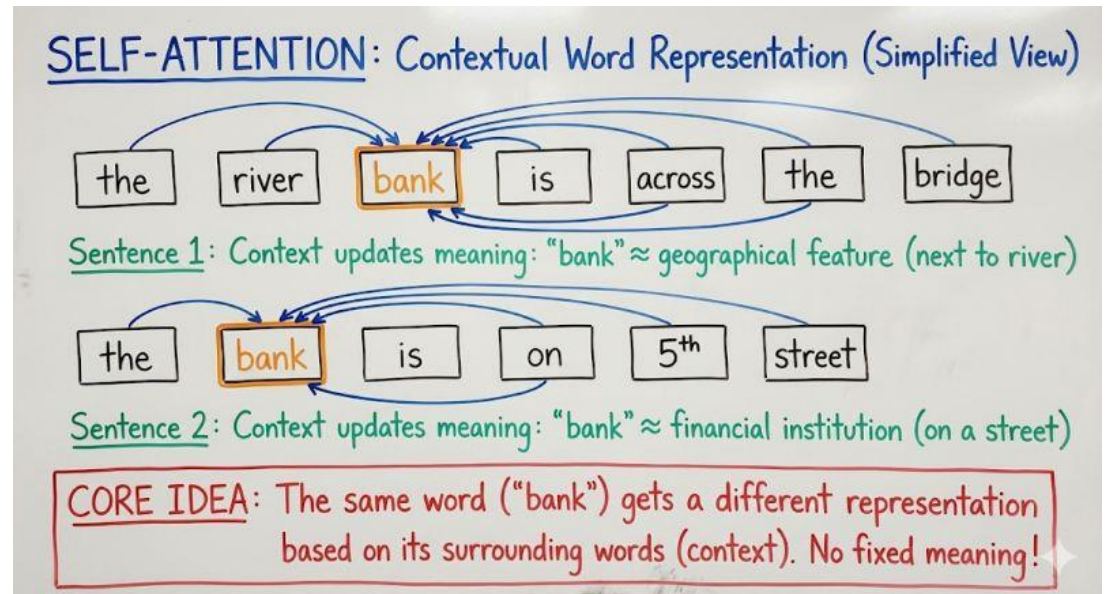


Sentence: **Word** **embedding** **represents** **a** **word** **as** **numerical** **data**.

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

# Context Matters

- Same word, different meaning in context.

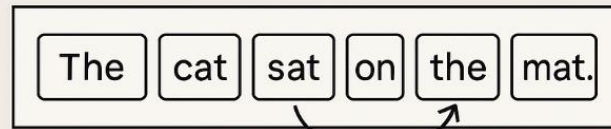


# Deep Learning

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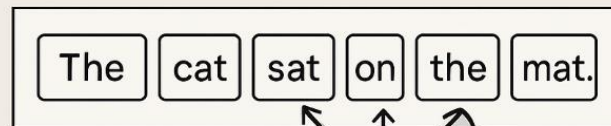
- Attention helps models focus on important words.

## 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

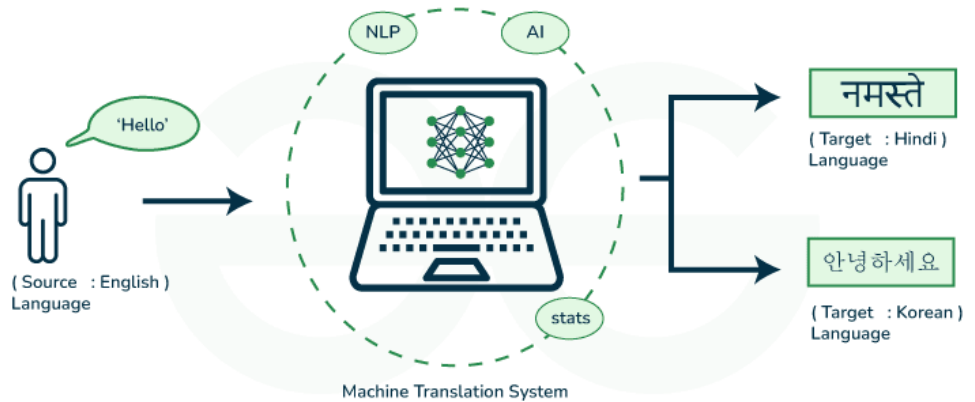
## Masked Attention



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

# NLP Applications

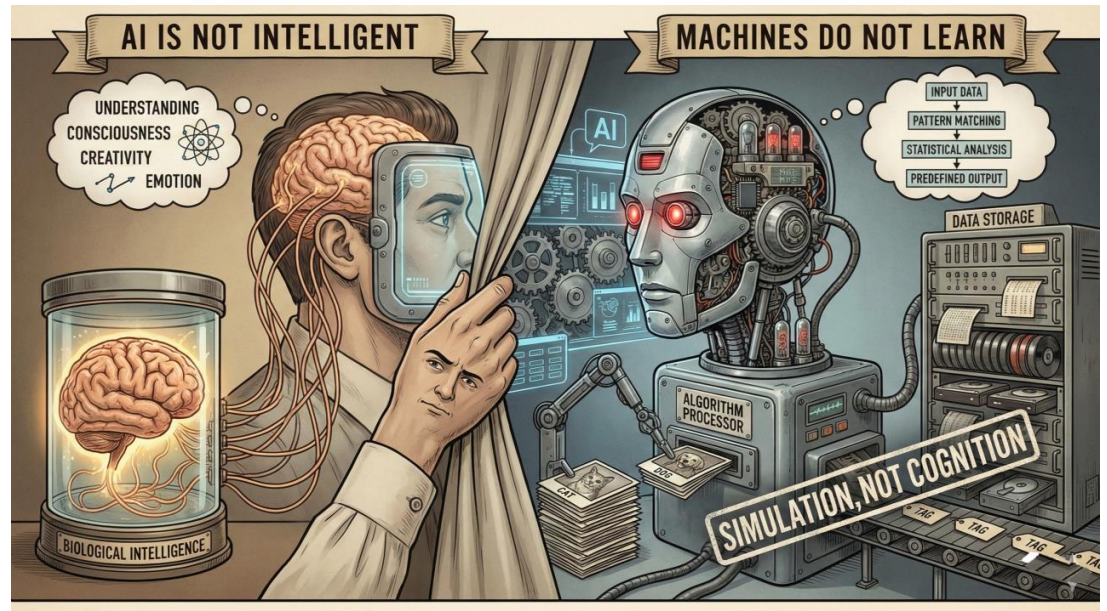
- Chatbots, Translation, Search, Sentiment Analysis.



# Key Insight

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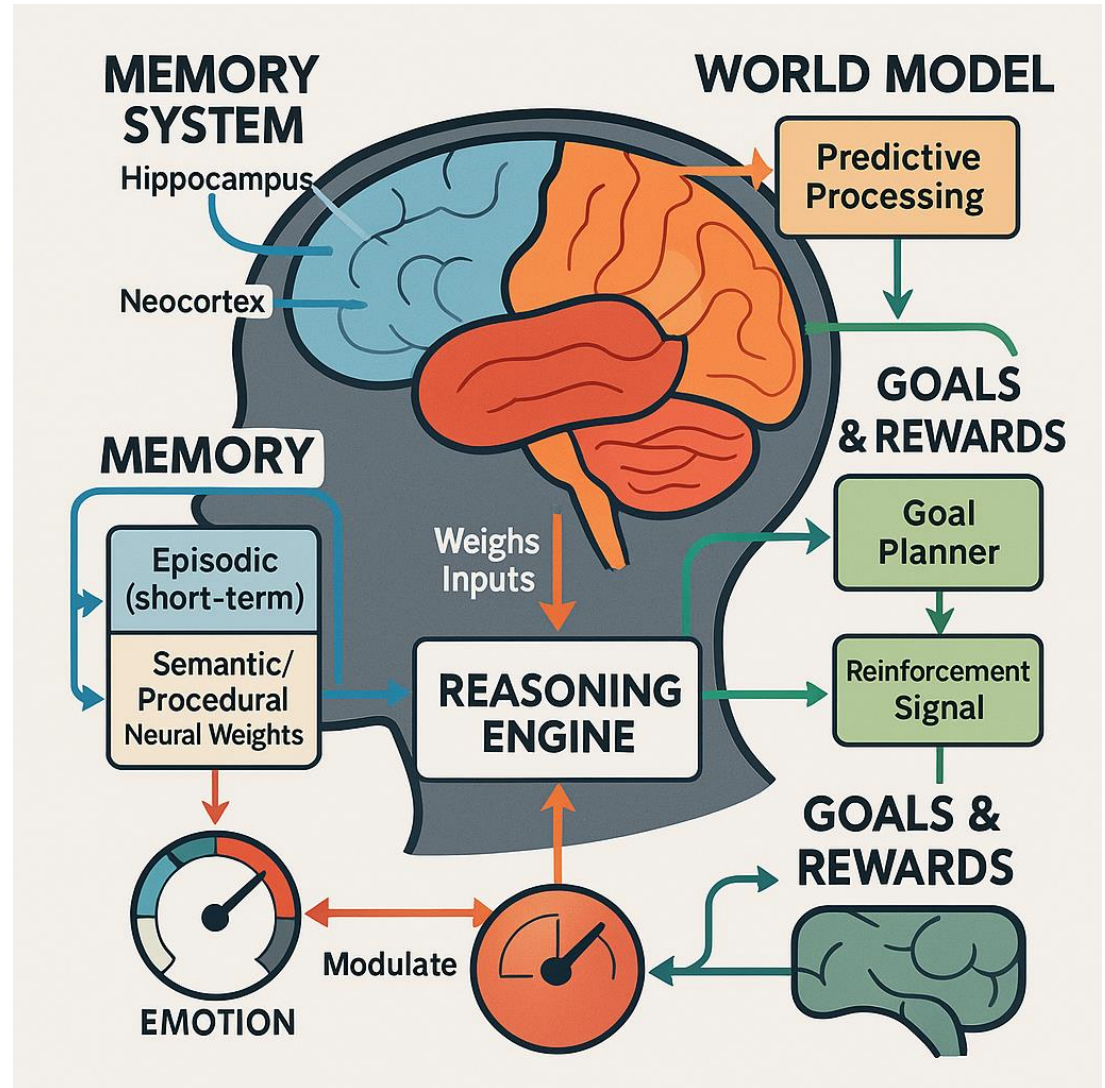
- NLP models patterns of understanding, not consciousness.





# Why Learn NLP?

- Language is core to AI and human intelligence.





# Course Roadmap

- From words → meaning → intelligence



Thank you !

