Computer science department

Master 2 Artifitial Intelligence

# Natural language processing and pattern recognition

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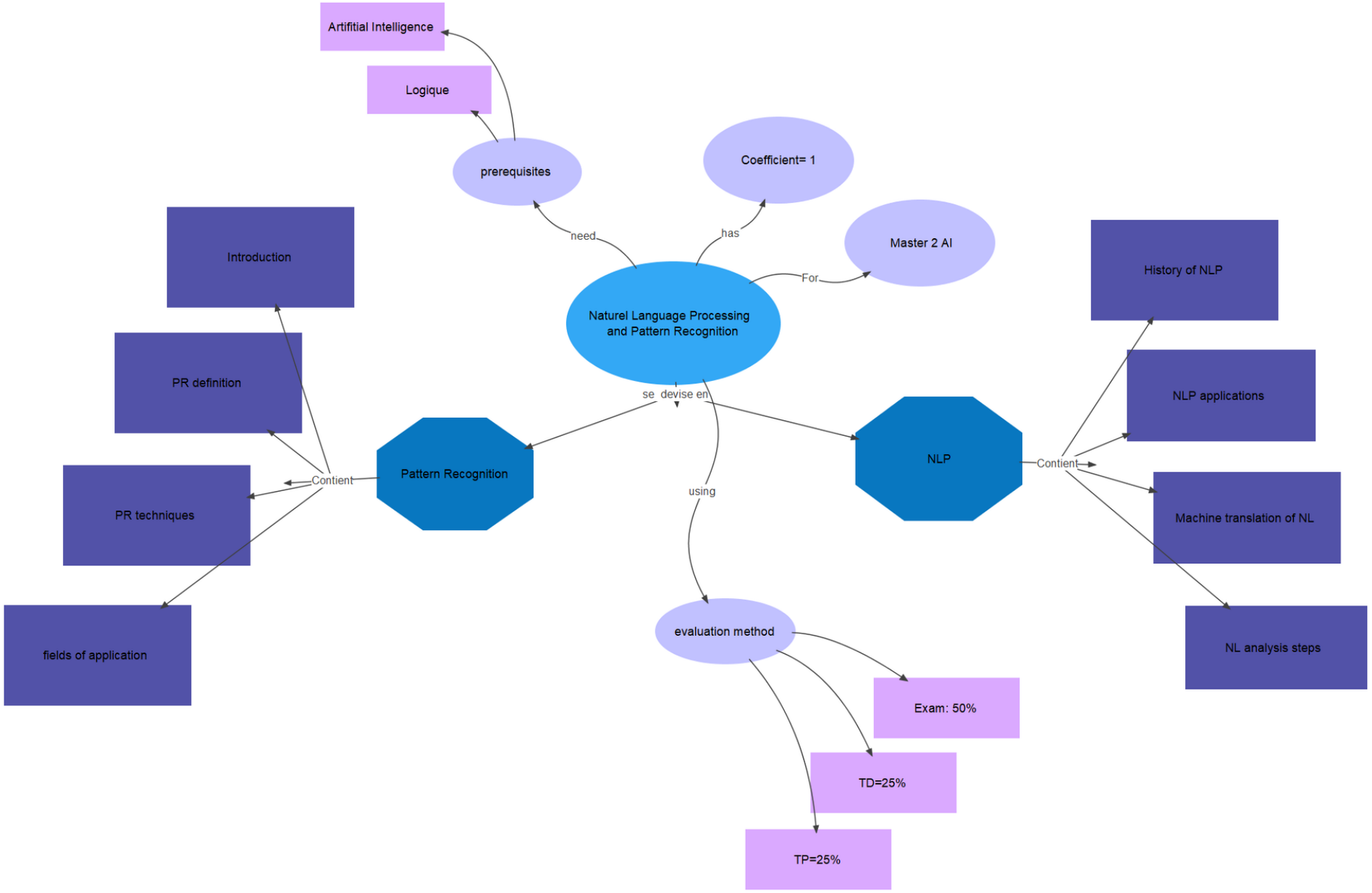
# About this course



# Natural Language Processing

# Introduction


How did humans communicate with computers before NLP?

# Introduction


To overcome the limitations of command-based interaction, AI researchers aimed to create systems capable of understanding and processing human language in a more dynamic and flexible manner. Early efforts in computational linguistics provided the foundation for NLP by concentrating on language structure, syntax, and grammar. This progress paved the way for more sophisticated techniques, which now allow machines to interpret and generate natural language in meaningful and intelligent ways.

# Introduction

Text files and documents

Server, website, and applications logs

Sensor data

Image files

Video files

Audio files

Emails

Social media data

When a person sees or hears a sentence, he makes full use of his knowledge and intelligence to understand it.

- grammar
- knowledge about words
- the context of the sentence
- his understanding of the subject matter.

To model this language understanding process, we need a program which combines **grammar**, **semantics**, and **reasoning** in an intimate way, concentrating on their interaction

# What is NLP?

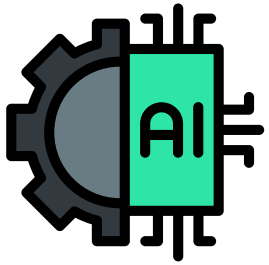
Grammarly a **Language** :

a finite set of symbols or alphabet.

sentences of finite length

the total number of possible sentences in a language is also finite.

# What is NLP?



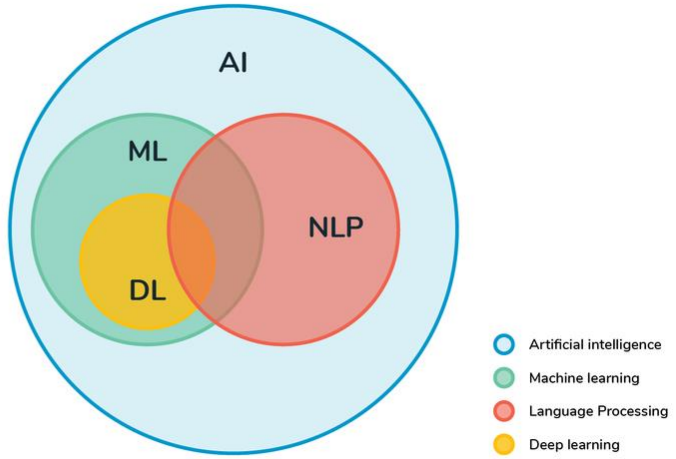

- branch of artificial intelligence

- enables computers to:

**comprehend**

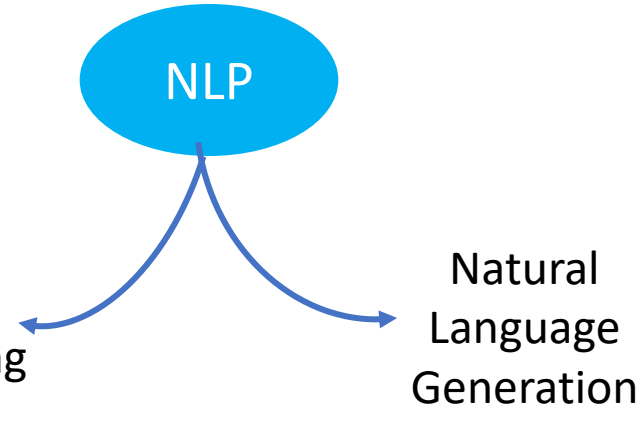
**interpret**

**use** human languages




- . It equips machines with the capability to **read** and **understand** text **process** and **interpret** speech

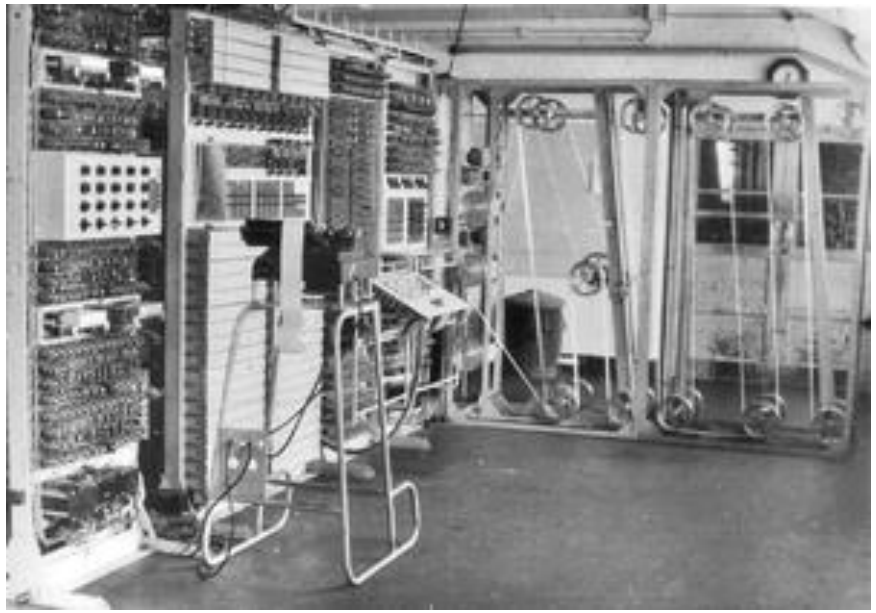
# What is NLP?




Linguistics is the science of language

NLG is the process of producing phrases, sentences and paragraphs

- Phonology: refers to sound
- Morphology: word formation
- Syntax
- Semantics
- Pragmatics: refers to understanding



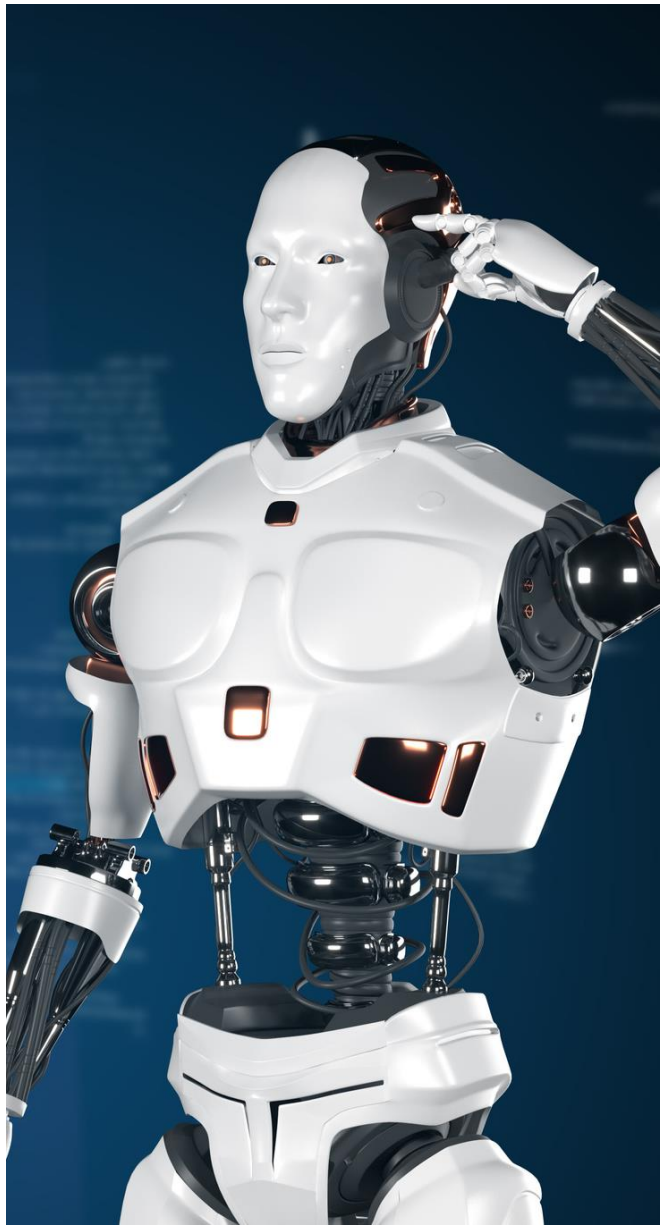
# History of NLP?

**1930** Georges Artsrouni and Peter Troyanskii have filed tow patents for translating machines

**1946** During the WWII the British developed "Colossus," a machine capable of decrypting the secret code generated by Enigma (German incrypting machine)

**1954** Georgetown University and IBM developed one of the earliest machine translation programs

**1960** Terry Winograd developed "SHRDLU," the first major NLP program capable of performing tasks in a simulated environment.



# History of NLP?

**1969** machine learning emerged, shifting from hand-coded rules to algorithms that could better handle ambiguity in language

**RECENTLY** deep learning has become the dominant approach in NLP, as it allows algorithms to map inputs to outputs without needing explicit rules. This has greatly improved the ability of machines to interpret the complexities and ambiguities of natural language.

# NLP applications


## Voice assistant

NLP is extensively utilized in IoT devices, with voice assistants like Cortana, Alexa, Siri, and Google Assistant becoming increasingly popular.

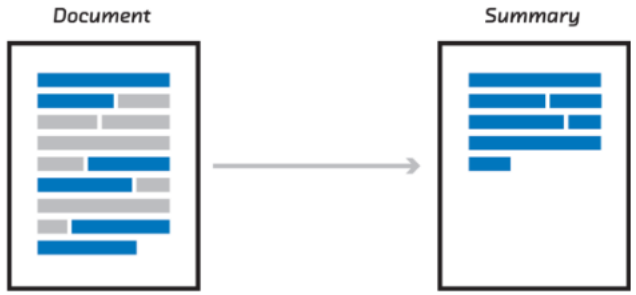
## Sentimental analysis

It helps businesses to filter out the essential information from a massive amount of text data and make an optimal decision in the right direction in order to max out their profits.

## Text analysis

the process of using computer systems to read and understand unstructured text for business insights.

# NLP applications

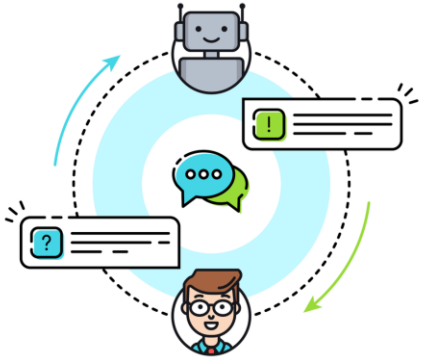



## Text summarization

It’s quite tiring and time-consuming to manually summarize long texts. We also risk omitting important details when reviewing sensitive documents. This is where text summarization comes in handy.


## translation

Search engines use machine translation tools to convert web page content into different languages while preserving the original meaning and message.



## Chatbot

a primary source of interaction between the site and the user. It processes the query entered by the user and displays results and suggestions accordingly.

# Natural Language Interface


NLI allow human-computer interaction through the translation of human intention (spoken or written human language) into devices' control commands

The interaction of users with computer with their natural language where not much skills are needed

# When to use NLI?

## Voice activated system

while driving, cooking, or for people with physical disabilities


## Search engine

Instead of typing specific keywords, users can input queries in a conversational manner

## Educational tools