Article 9: Natural Language Processing (NLP): Techniques and Applications

Natural Language Processing (NLP) is a field of artificial intelligence focused on enabling computers to understand, interpret, and generate human language. It combines linguistics, computer science, and machine learning to process textual and speech data.

Core Techniques in NLP

- **Tokenization:** Breaking text into words or sentences.

- **Part-of-Speech Tagging:** Assigning grammatical categories to words.

- **Named Entity Recognition (NER):** Identifying names, locations, organizations.

- **Sentiment Analysis:** Determining the emotional tone of text.

- **Machine Translation:** Automatically translating text between languages.

- **Language Modeling:** Predicting the next word or sequence in text.

Applications

- **Chatbots and Virtual Assistants:** Automating customer support.

- **Search Engines:** Improving query understanding.

- **Text Summarization:** Condensing long documents.

- **Spam Detection:** Filtering unwanted emails.

- **Healthcare:** Extracting insights from medical records.

Challenges

NLP systems must handle ambiguity, sarcasm, context, and diverse languages. Recent advances use deep learning models like transformers (e.g., BERT, GPT) to improve understanding.