Introduction

NLP enables machines to process and analyze large amounts of human language data. It bridges the gap between human communication and machine understanding.

Core Techniques

- **Tokenization**: Breaking text into smaller units like words or sentences.
- **Stemming and Lemmatization**: Reducing words to their base or root form.
- **Named Entity Recognition (NER)**: Identifying proper nouns, dates, and other entities.

Applications

1. **Chatbots**: Provide automated customer support.
2. **Sentiment Analysis**: Analyzes user opinions in reviews and social media.
3. **Language Translation**: Converts text from one language to another using models like Google Translate.

Recent Advancements

- **Transformers**: Models like BERT and GPT have transformed NLP with their ability to understand context.
- **Zero-shot Learning**: Allows models to perform tasks without explicit training data.

Challenges

- **Ambiguity**: Many words in natural language have multiple meanings.
- **Bias**: Training data can introduce biases, leading to unfair outcomes.