ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TRAINING TR-102 REPORT DAY 17 15 JULY 2025

Overview:

The seventeenth day of training focused on Natural Language Processing (NLP) — a crucial subfield of Artificial Intelligence that enables computers to understand, interpret, and generate human language.We explored how NLP bridges the gap between human communication and machine understanding, allowing AI systems to process text and speech data effectively

Learning Objectives:

• Understand what Natural Language Processing (NLP) is and its importance in AI.
 • Learn about different stages of text processing and feature extraction.
 • Explore NLP techniques such as tokenization, stopword removal, stemming, and lemmatization.
 • Implement basic NLP operations using Python libraries.
 • Understand real-world applications of NLP in AI systems.

Introduction to NLP

Natural Language Processing (NLP) is a field of AI that focuses on enabling machines to read, understand, and derive meaning from human language.It combines elements of Linguistics, Computer Science, and Machine Learning to process text and speech data.In simple terms, NLP helps computers "understand" what humans say or write — whether it's a chatbot interpreting a message or a translation system converting one language to another.

Basic NLP Techniques

a. Tokenization

Tokenization is the process of splitting text into smaller parts called *tokens* (words or sentences).

b. Stopword Removal

Stopwords are common words (like *the, is, and, a*) that don't carry much meaning. Removing them makes text analysis more efficient.

c. Stemming

Stemming reduces words to their root form by chopping off suffixes.

d. Lemmatization

Lemmatization converts a word to its meaningful base form (lemma) using vocabulary and grammar.

Applications of NLP

1. **Chatbots and Virtual Assistants:**
   Used in customer service and AI assistants (ChatGPT, Alexa, Siri).

2. **Machine Translation:**
   Converts text between languages (Google Translate).

3. **Sentiment Analysis:**
   Determines emotional tone in text (positive, negative, neutral).

4. **Speech Recognition:**
   Converts spoken language to text.

5. **Text Summarization:**
   Automatically generates concise summaries of documents.

6. **Spam Detection:**
   Filters unwanted or harmful emails based on content.

Conclusion:

Day 17 provided a comprehensive understanding of Natural Language Processing, a fundamental pillar of modern Artificial Intelligence.We learned how NLP enables machines to interpret human language through a series of linguistic and computational techniques