ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TRAINING TR-102 REPORT DAY 15 11 JULY 2025

Overview:

The fifteenth day of training focused on understanding LLaMA (Large Language Model Meta AI) — an advanced Large Language Model (LLM) developed by Meta (Facebook).We learned how LLaMA functions, how it compares to other LLMs like GPT and Gemini, and how it contributes to the evolution of modern Natural Language Processing (NLP) and Generative AI.

Learning Objectives:

• Understand what LLaMA is and how it fits into the family of Large Language Models.

• Learn the architecture and training principles behind LLaMA.

• Compare LLaMA with other popular LLMs such as GPT and BERT.

• Explore the applications and capabilities of the LLaMA model.

• Understand the significance of open-source AI research and its real-world impact.

Introduction to LLaMA

LLaMA (Large Language Model Meta AI) is a family of foundation language models developed by Meta AI in 2023.
 It is designed to perform a wide range of tasks such as text generation, summarization, translation, and reasoning, similar to models like GPT (OpenAI) and Gemini (Google DeepMind).LLaMA stands out for being open-source, enabling researchers and developers worldwide to experiment with, modify, and fine-tune the model for various AI applications.

Architecture of LLaMA

LLaMA is based on the Transformer architecture, which uses self-attention mechanisms to understand relationships between words in a sentence.

Key Components:

1. **Tokenization:**
   Breaks text into smaller units (tokens) for processing.

2. **Embedding Layer:**
   Converts tokens into numerical representations that capture semantic meaning.

3. **Transformer Blocks:**
   Stacks of multi-head self-attention and feedforward layers allow the model to understand word context globally.

4. **Positional Encoding:**
   Helps the model recognize word order and sequence.

5. **Output Layer:**
   Generates probability distributions over possible next tokens to produce coherent text.

Training Process of LLaMA

LLaMA models are trained using unsupervised learning on vast text datasets, including:

- Books

- Research papers

- Wikipedia

- Web data

Training Characteristics:

- **Objective:** Predict the next word in a sequence (next-token prediction).

- **Optimization Algorithm:** Adam optimizer.

- **Data Scale:** Trained on over 1 trillion tokens.

- **Hardware:** High-performance GPUs and TPUs for parallel training.

Advantages of LLaMA

- Open-source and free for research use.

- High accuracy and contextual understanding.

- Scalable across multiple model sizes (7B–400B).

- Supports multilingual and multimodal data.

- Can be fine-tuned easily for industry-specific needs.

Limitations of LLaMA

- Requires high computational resources for large versions.

- May still generate biased or inaccurate outputs if not fine-tuned properly.

- Needs careful moderation for ethical use and misinformation prevention.

Conclusion:

Day 15 provided valuable insight into one of the most advanced and accessible Large Language Models — LLaMA by Meta.
 We learned how it functions, how it differs from other LLMs, and why it plays a vital role in open-source AI innovation.This session strengthened our understanding of modern Generative AI, bridging the gap between theory and real-world AI applications.