2024 Summer Research Training
Tasks for LLM Teams / Week 1

Announced: 13.08.2024
Deadline: 20.08.2024 23.59

Create a github repo named SRT2024-LLM-Team-X (X is your team number).
Submit all your work to your github repo. Keep the repo organized. Add at-ay to your repo as a collaborator.

→ You will have both a theoretical and a practical work for the Week 1.

Theoretical Work

Aim: Understand How LLMs Work. Carry out detailed research as a group. Frequently discuss your finding between members. At the end you will prepare a 7 mins presentation.

Some questions for guiding your theoretical work (You are not limited with the below outline)

1. **What is an LLM, and how does it differ from other types of machine learning models?**
    - Focus on explaining the concept of LLMs and compare them with other models, such as traditional machine learning algorithms and simpler NLP models.
2. **How does the Transformer architecture work, and why is it important for LLMs?**
    - Focus on the mechanics of the Transformer model, including the self-attention mechanism, and why this architecture has been revolutionary for NLP.
3. **What are the steps involved in pre-training and fine-tuning an LLM?**
    - Explain the difference between pre-training (general knowledge) and fine-tuning (task-specific knowledge) and the significance of each step.
4. **How does tokenization work in LLMs, and why is it important?**
    - Explore how text is broken down into tokens and how this process affects model performance.
5. **What are embeddings, and how do they represent language in LLMs?**
    - Investigate how words and sentences are converted into numerical vectors that the model can understand.

6. **How are LLMs evaluated, and what metrics are used to measure their performance?**
    - Learn and discuss various evaluation metrics like perplexity, accuracy, and human evaluation.
7. **What are the real-world applications of LLMs, and how are they currently being used in industry?**
    - Look into how LLMs are applied in areas such as chatbots, content generation, translation, and more.

Practical Work

→ Develop at least one simple LLM application using the LangChain framework. (Every member should develop a different application)
→ You can use OpenAI Api for the application development (be careful, it is NOT free, you can use the cheapest model). If you prefer you can also use non-OpenAI models, as well.
→ Do not blindly follow tutorials. First go over LangChain documents to undestand the basics of the framework. Understand what is a “chain”, “prompt template”, “memory”, etc.
→ For this week don’t use any agents yet. Do not use LangGraph framework, yet.
→ Do not use RAG technique, this is for coming weeks.