OpenEuroLLM

Research Data Day & EOSC NTE Brno

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OpenEuroLLM

Our goal:

Open
Multilingual
European
Generative
Foundational
LLM

- Open Source (in full)
  including fully inspectable data
- 32+ languages
  EU + associated (+ business)
- High-quality
  standard and native benchmarks
- Compliant with EU regulations

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What is a Large Language Model

- Known to the public primarily as conversational LLM (e.g. ChatGPT, Llama-3.3-70B-Instruct)
- Technology
  - Deep Neural Networks
  - Trained from data (texts) – Machine Learning
  - Basic function: generate next word (segment, token) based on (long) sequence of previous words (tokens)
    - In interactive systems: start with a user „prompt“
    - Can be up to a million words (in some LLM systems)

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What is a (base, foundation(al)) LLM?

- Model trained on running text only
  - i.e., not interactive
  - Cannot answer questions
  - Can be monolingual, multilingual, include (source) code
  - Can be multimodal (w/suitably encoded images, video, etc.)
- It is a basis for applications
  - Interactive (chatbot, conversational) LLM) is created by
    - fine-tuning, continous pre-training
    - human interaction – anotated data, relevance rating, etc.

How large is a Large Language Model?

- Model size is specified as
    - Number of parameters (wieghts), in millions (M) or [U.S.] billions (B)
        - Weight is a „real“ number in certain precision (from 32 down to 1.58 bit)
            - From that, byte size can be calculated: (1B weigths à 8 bit = 1 GB)
- Known model sizes (open-weigth models)
    - Llama 3.1: 405 B parameters (META / Facebook)
    - Llama 3.3: 70 B parametrů
        - Quantized (smaller precision than original) e.g. to 6 bits: 53 GB size)
        - For inference („runtime“): 1 or more GPU cards
            - Context size matters: takes a large proportion of GPU card’s memory
- Model training:
    - Number of parameters fixed (in the standard setting)
    - Different data (text) sizes (in words/tokens: tokenization very important)
        - Llama 3.1: 15 T (trillion) tokens

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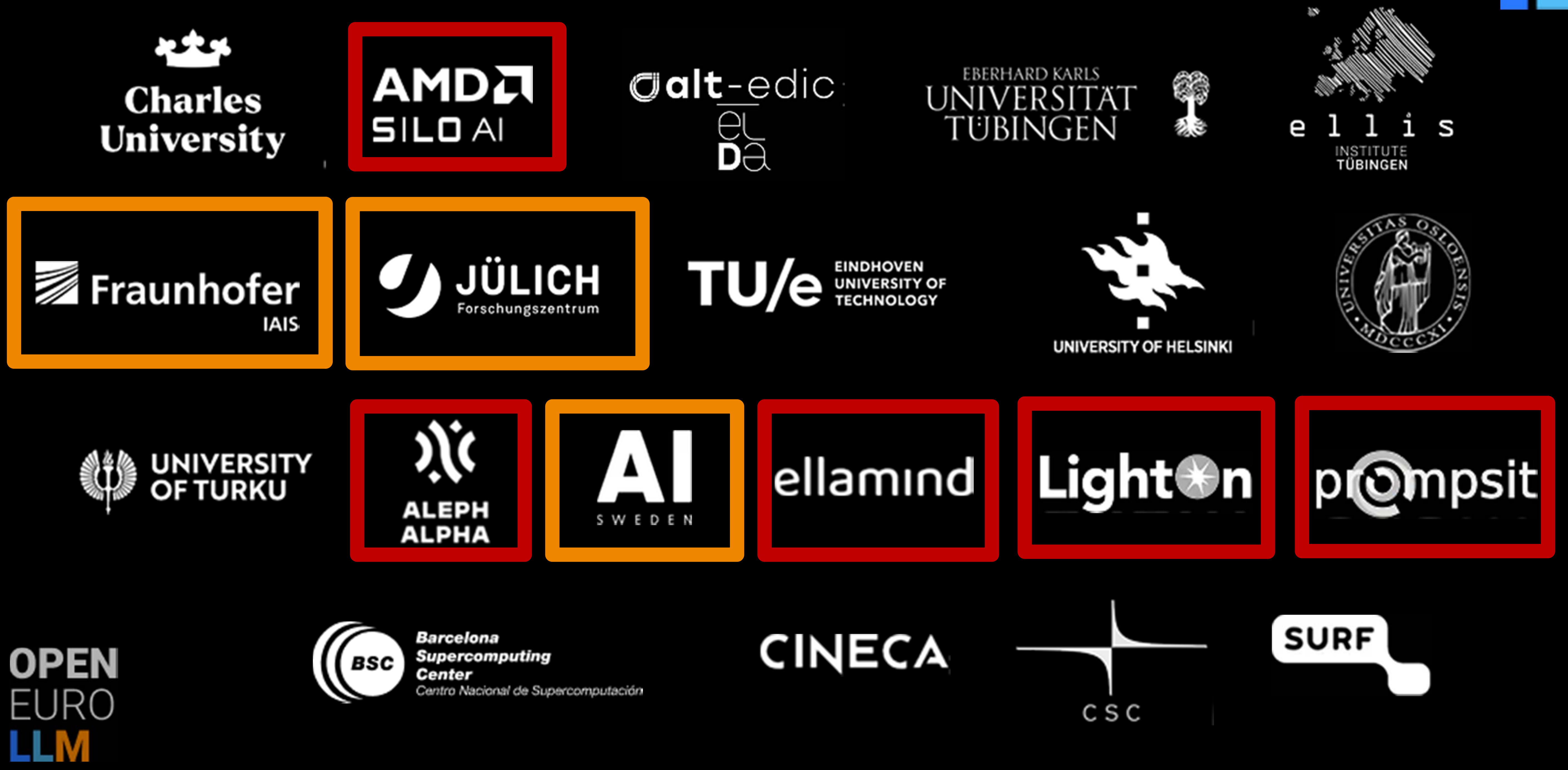

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Wider context

- Programme: Digital Europe (25/50% co-funding)
- Set of AI-06 calls (projects started Jan-Mar 2025):
  - Two large projects: OpenEuroLLM and LLMs4EU
  - Coordination (ALT-EDIC4EU), total **~80 mil. EUR + HPC**
  - Part of an ecosystem (Deploy AI, TAILOR, TrustLLM, HPLT, …)
- Together we will
  - Develop open, high quality foundation models
  - Adapt them to applications in all areas, from commerce to egovernment and education
  - Contribute to EU’s digital sovereignty

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Open Source and Community

- Open Strategic Partnership Board (Strategic advisory role)
  - Open source community members
  - Experts on LLMs (incl. from non-EU ones)
    - Former commercial and/or open source model developers
- Experts on legal issues
- Informal cooperations
  - Data side: CommonCrawl, Internet Archive EU, OpenWebSearch (TBC)
  - Open source models community
    - EuroLLM (Univ. of Edinburgh, UnBabel)
    - LAION, open-sci, …

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Computing facilities

- 5 EuroHPC centers on board (project partners)
    - Technical expertise
        - Jumps start using the respective facilities
- Some compute available from previous projects
- Participation in EuroHPC calls in 2025
    - In line with project plan for the rest of 2025
- Strategic allocations in the future
    - “STEP” seal awarded
    - Using current facilities & new in AI Factories (2026/2027)
        - Just received 3m GPU hours for May-Nov. 2025 on Leonardo (CINECA)

Data for 37+ languages

- Using available Open Source data
  - HPLT 2.0 (HPLT 3.0, July 25), Fineweb2, Cultura-X, …
  - Mixtures to be experimentally determined
    - Ultimate (re)sources: CommonCrawl, Internet Archive, IA Europe
    - OpenWebSearch – negotiations ongoing
- Focus on low-resource languages for additional data
  - Incl. specific cases for very similar languages
- Additional data for
  - Fine-tuning, instruction-tuning, reasoning
    - … if necessary for benchmarking

Evaluation and Benchmarking

- For initial experiments:
  - Standard benchmarks for base models
- Project longer-term goal
  - Benchmarks for all languages in native form
    - i.e., manually translated or inspected, incl. contents
- Continuous evaluation
- Tests for evaluation data purity
  - I.e., not used in training/SFT/…
- Models released based on evaluation results

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Thank you!

- Questions?

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