

# Seminar Topics: Large Language Models

Viktor Hangya

hangyav@cis.lmu.de

# Emergent Capabilities of LLMs

- ▶ An ability is emergent if it is not present in smaller models but is present in larger models.
  - ▶ Perform multiple tasks for which the model was not directly trained
    - ▶ E.g. *Summarize the following text: <long text>*
  - ▶ Few-shot prompting: being able to perform a task by looking at a few examples
    - ▶ E.g. various tasks or methods (giving a step-by-step explanation)
- ▶ Project:
  - ▶ What capabilities are emergent?
  - ▶ What aren't?
  - ▶ Why does it happen?
  - ▶ What are the main factors behind emergent abilities?
  - ▶ Are there any limitations or risks?
- ▶ Resources:
  - ▶ [Wei et al., 2022, Emergent Abilities of Large Language Models \*Transactions on Machine Learning Research\*](#)

## Chain-of-Thought Prompting

### Model Input

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls.  $5 + 6 = 11$ . The answer is 11.

# The Position of Relevant Information in the Input

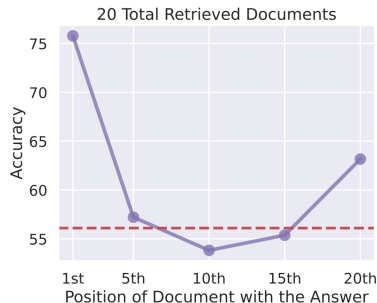
- ▶ LLMs can read very long inputs
  - ▶ However, some of it might be irrelevant for the task  
e.g. answer a question based on a few context documents
  - ▶ The position of the relevant content does matter

- ▶ Project:

- ▶ What techniques can help handling long inputs?
- ▶ Do longer inputs make LLMs better?
- ▶ Why does the position of relevant content matter?
- ▶ Can we improve?

- ▶ Resources:

- ▶ Liu et al., 2023, **Lost in the Middle: How Language Models Use Long Contexts**  
*Transactions of the Association for Computational Linguistics*



# Cross-Lingual Transfer Capabilities of LLMs

- ▶ Cross-lingual transfer learning:
  - ▶ Given training data in a resource rich language build a model for low-resource languages
  - ▶ Multilingual models are needed
  - ▶ Few-shot cross-lingual prompting: show examples in **English** but generate an output for a **target language** sample

I am happy. Positive; I am sad. Negative; Ich bin glücklich. [?]

- ▶ Project:
  - ▶ How does cross-lingual prompting work?
  - ▶ Describe its different forms.
  - ▶ How good LLMs are in different languages?
- ▶ Resources:
  - ▶ Akari et al., 2023, **BUFFET: Benchmarking Large Language Models for Few-shot Cross-lingual Transfer** *arXiv*