

# Foundations of Natural Language Processing

Peking University, 2024

## Assignment: Report on Cutting-Edge Topics in NLP

**Due: Sunday, April 7, 2024, 11:59 PM**

### Task Description

The advent of large language models (LLMs) has sparked a significant shift in research paradigms within NLP, leading to a surge of exploration into new research avenues. In this assignment, you will delve into one of the following topics, each exploring the intersection of LLMs with another domain/problem/scenario. **Your task is to choose one of the following topics (LLM + X) and write a report on recent advancements in NLP pertaining to your chosen topic.**

Possible topics:

- **LLM + Fact checking (事实核查):** verifying statements with reliable resources; fighting against misinformation; detecting LLM hallucinations...
- **LLM + Causal reasoning (因果推理):** whether LLMs acquire causal knowledge; how LLMs facilitate causal reasoning; how causal reasoning help LLMs...
- **LLM + Science (科学):** using LLMs to empower research in biology, physics, chemistry, economics, meteorology...
- **LLM + Code (代码):** training models for code generation; importance of code data in LLM pretraining; boosting reasoning in the form of code...
- **LLM + Human computer interaction (人机交互):** towards human-centered NLP, reflecting human in data collection, model development and evaluation...
- **LLM + Low-resource languages (低资源语言):** efficient language adaptation; LLM-based data collection; applications for protecting low-resource languages...
- **LLM + Multi-modality (多模态):** vision-language understanding, text-to-image generation, embodiment, robotics...
- **LLM + Safety (安全):** privacy (information leakage, threats & attacks), security (poisoning & backdoor attacks)...
- **LLM + Debiasing (偏见消除):** detecting and mitigating gender bias, geographical bias...
- **LLM + Explainability (可解释性):** understanding the Transformer architecture, mechanism behind prompting and in-context learning...

## Suggestions on Writing Reports

To write a good report, you need to select a topic that aligns with your interests and aspirations. Once you have identified a topic of interest, it is essential to conduct a thorough literature review and analysis of pertinent papers. This process will allow you to gain a comprehensive understanding of the subject matter and effectively convey your insights.

Furthermore, it is beneficial to relate your findings to real-world applications or personal interests. By contextualizing the research within practical scenarios or areas of personal relevance, you can enhance the depth and relevance of your report.

Additionally, consider incorporating images to complement your written content. Visual elements such as charts, graphs, or diagrams can help illustrate key concepts and enhance the overall readability of your report.

## Requirements

1. **Deadline:** Sunday, April 7, 2024, 11:59 PM
2. **Template:** Please use the provided LaTeX template. You can write either in English or in Chinese. We recommend using Overleaf (<https://www.overleaf.com/read/qbtqfvffrvgx#4bd638>).
3. **Report length:** No more than 6 pages.
4. **Submission files:** Please submit (1) a PDF file of the report and (2) a ZIP file containing the LaTeX source files (for plagiarism check).
5. **Grading criteria:** Emphasis is placed on analysis of existing progress and your own insights. Do not simply list papers.