Chair of Explainable AI-Based Business Information Systems
Prof. Dr. Ulrich Gnewuch

Bachelor Thesis: Designing an LLM-based Learning Assistant

Supervisor: Prof. Dr. Ulrich Gnewuch (ulrich.gnewuch@uni-passau.de)
Start date: as soon as possible

Motivation and Goals

Large language models (LLMs), such as ChatGPT and Gemini, have become popular among students for assisting with homework and preparing for exams. However, these general-purpose models are not always ideal, as they are trained on a wide array of topics rather than specific course content. This can lead to issues, such as hallucinations and inaccuracies, which negatively impact the learning experience.

The goal of this bachelor thesis is to develop an LLM-based learning assistant tailored to one of the chair's lectures. The learning assistant should leverage the retrieval-augmented generation (RAG) framework, combining the strengths of general-purpose language models (e.g., GPT-4, Llama) with accurate, course-specific knowledge (e.g., lecture slides and videos).The overall development process should follow the design science research approach (Hevner et al., 2004) and include a small-scale evaluation of the prototype with students enrolled in the lecture.

Required Skills

- Strong interest in (generative) AI and LLMs
- Good English language skills
- Basic programming skills (e.g., Python)

Starting Literature (Topic)

Fütterer, T., Fischer, C., Alekseeva, A., Chen, X., Tate, T., Warschauer, M., & Gerjets, P. (2023). ChatGPT in education: global reactions to AI innovations. *Scientific Reports*, 13(1), 15310. https://doi.org/10.1038/s41598-023-42227-6

Amoozadeh, M., Daniels, D., Nam, D., Kumar, A., Chen, S., Hilton, M., ... & Alipour, M. A. (2024, March). Trust in Generative AI among students: An exploratory study. In *Proceedings of the 55th ACM Technical Symposium on Computer Science Education* V. 1 (pp. 67-73). https://doi.org/10.1145/3626252.3630842

Gao, Y., Xiong, Y., Gao, X., Jia, K., Pan, J., Bi, Y., ... & Wang, H. (2023). Retrieval-augmented generation for large language models: A survey. https://arxiv.org/abs/2312.10997

Starting Literature (Method)

Vom Brocke, J., Hevner, A., & Maedche, A. (2020). Introduction to design science research. *Design science research*. *Cases*, 1-13. https://doi.org/10.1007/978-3-030-46781-4_1

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly*, 75-105. https://doi.org/10.2307/25148625