

# Conversational Job Recommender Systems

## A Feasibility Study using Natural Language Processing

### Students



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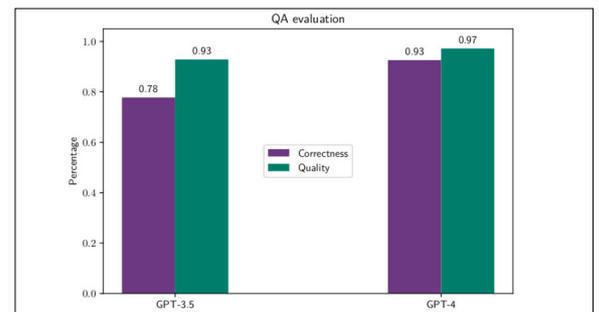
**Introduction:** The recent advancements in Natural Language Processing (NLP) have spurred a significant interest in the field, with chatbots becoming an increasingly common feature across various domains. In every industry, questions are emerging regarding the abilities and challenges of these contemporary models. We were assigned the task of exploring the feasibility of developing a chatbot designed to assist in finding jobs. This involves comprehending the clients' interests and abilities in a manner that enables precise recommendations. Essentially, the chatbot would be powered by AI to identify the clients' skills and preferences, and then provide suitable suggestions based on these insights. The aim of this thesis is to assess the potential of current NLP models in creating such a chatbot, and to pinpoint the possible challenges that might arise in its implementation.

**Approach:** Our study focused towards recommending apprenticeships rather than a broader range of professions. Data from several Swiss career guidance websites was collected using web-scraping techniques and merged into a database. The chatbot problem was decomposed into several sub-tasks for information retrieval, recommendation and question answering. This modular approach allows the use state-of-the-art (SOTA) Large Language Model (LLM) such as GPT-3.5 and GPT-4 to address sub-tasks, while also allowing individual evaluation of each module. A publicly accessible website has been set up for easy demonstration, lowering also the effort for a future field trial.

**Conclusion:** We have demonstrated the feasibility of constructing a chatbot that can identify customer interests and abilities during an interactive conversation and subsequently recommend an appropriate apprenticeship. The real-world effectiveness of the chatbot remains to be validated through comprehensive field trials. The challenges we encountered during this thesis include the limited availability of data and access to Application Programming Interface (API)s, the rapidly evolving field of LLMs, and the inconsistent performance of the models.

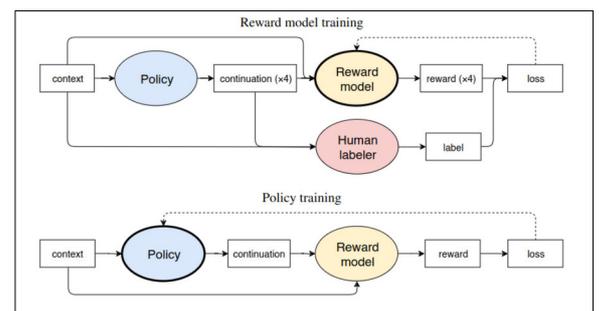
### Evaluation of the Question Answering models.

Own presentation



### Fine tuning process of LLMs.

Fine-tuning language models from human preferences



### Example of a prompt for job recommendation.

Own presentation

**System message**

Du bist ein schweizer Berufsberater der sich ausgezeichnet mit EFZ-Lehrberufen auskennt. Erstelle mir eine Dictionary mit den 5 EFZ-Lehrberufen die am besten zu mir passen. Gib mir zu jedem dieser 5 Lehrstellen ein match value zwischen 0 und 1 an. Formatiere das Dictionary wie im Beispiel: ["Bühnenanzer/in EFZ": value(0-1), "Bootsbauer/in EFZ": value(0-1), "Drogistin EFZ": value(0-1), "Grafiker/in EFZ": value(0-1), "Metallbauer/in EFZ": value(0-1)] Wöörthle aus der folgenden Liste aus: {job\_list}

**User message**

Ich arbeite gerne mit Metall. Ich bin handwerklich geschickt. Ich verfüge über einen guten praktischen Verstand.

**GPT output**

["Metallbauer/in EFZ": 0.9, "Anlagen- und Apparaturbauer/in EFZ": 0.85, "Polymechaniker/in EFZ": 0.8, "Konstrukteur/in EFZ": 0.75, "Automobil-Mechatroniker/in EFZ": 0.7] [0.9]

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Subject Area  
Data Science

