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CREATING A WORKING SOFTWARE TOOL BASED ON A MINI LLM FOR THE ADMISSION COMMITTEE

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Abstract: It is noted that the admission process to higher education institutions is becoming increasingly complex from year to year, which is associated with a large number of administrative tasks, repetitive questions and increased activity of applicants. Therefore, this thesis proposes a conceptual model of an intelligent system based on Mini-LLM, designed to optimize the work of the admissions committee and automate a number of processes. This approach involves integrating Mini-LLM with a knowledge base containing admission rules, curricula, internal university procedures and relevant regulatory documents. Mini-LLM requires significantly fewer resources and funds compared to full-scale LLM models, which, while increasing the efficiency of the admission process, presents the system as a cost-effective and quickly implemented solution.

Keywords: Mini-LLM, LLM, Admission Process Automation, Artificial Intelligence in Education, Intelligent Decision Support Systems, Natural Language Processing (NLP), Lightweight Language Models, Knowledge-Based Advisory Systems

In recent years, as a result of the increase in the number of quotas in higher education institutions, the increase in new directions, changes in contract amounts, and the adoption of various laws and resolutions, the tasks and burdens of the admissions committee have also increased. That is, during the admissions period, countless questions from applicants, phone calls, and the repetition of similar or exactly the same questions complicate the work of employees. This requires additional time, stress, lack of staff, and additional resources. The solution to this is the need to automate this process.

The gradual digitization of education in recent years has further accelerated the introduction of AI-based management systems. Chatbots, automated consulting systems, document processing modules, and digital secretarial services are now seen as effective tools for simplifying and optimizing academic processes. Research by major technology companies - DeepMind, OpenAI, Meta AI, and Microsoft Research - shows that large language models (LLMs) are capable of performing complex natural language processing tasks with very high accuracy. However, since LLMs work with very large parameters, their implementation on local infrastructure is much more complicated.As a result, the need for technical resources to implement such systems increases dramatically. Therefore, in recent years, researchers have increasingly focused on creating lightweight, low-resource Mini-LLM models. Experiments on Phi-2 and Phi-3 developed by Microsoft Research, Meta's LLaMA 3.1 model, Gemma created by Google DeepMind, as well as Mistral 7B provided by Mistral AI show that small-scale models can often produce results close to the level of large models when tuned in a specific direction. Experiments on open-source models in the HuggingFace Model Hub show that lightweight models such as LLaMA 3.1-8B Instruct, Qwen2-7B, Gemma-2B, and Mistral 7B Instruct can produce stable and reliable results even in resource-constrained environments. It has been shown that the application of lightweight training techniques-specifically PEFT and LoRA approaches-can significantly enhance the generation of context-appropriate and domain-specific responses by Mini-LLM models.As a result, it is also emphasized in scientific sources that light, fast and resource-efficient intelligent systems based on Mini-LLMs allow to automate important stages of the admission

process, simplify interaction with applicants and increase the efficiency of data processing. Nevertheless, an analysis of the existing scientific literature shows that there are very few special studies devoted to the use of Mini-LLM models to automate the admission process of higher education institutions. Most existing developments are limited to chatbots used in general education management or e-learning systems, and solutions adapted to the admission process are almost non-existent. Therefore, this study proposes the concept of an intelligent system based on Mini-LLMs for automating the admission process, based on a systematic, methodological and practical approach.

The research methodology involves the creation of a pilot sample of an intelligent software tool capable of partially automating the admission process based on the Mini-LLM model and a practical evaluation of its effectiveness. The methodology consists of five elements that gradually organize the process of creating the system: first, the system architecture is developed, the necessary data set is formed, the Mini-LLM model is adapted to the admission process, a prototype is created and integrated. Finally, the initial effectiveness of the system is tested.

This methodological sequence ensures that the research process is conducted in a consistent and controlled manner and strengthens the scientific validity of the system being developed.

1. The main components of the system - UI, model, database, and backend - are defined. The function of each module and the data exchange between them are clearly defined. The architecture is designed to process applicant questions quickly and reliably.

2. The necessary documents, regulations, and FAQ information for the admission process are collected. These texts are cleaned, sorted, and presented in the form of questions and answers. For the RAG system, the texts are divided into small pieces and embeddings are created for them.

3. The selected Mini-LLM model (LLaMA, Phi-3, Mistral, etc.) is retrained to adapt to the admission process. First, the model is adapted to the general instruction format, and then it is enriched with domain knowledge related to admission. The training process is optimized for efficient operation even on servers with low resources.

4. The adapted model is integrated with the user interface via the backend. The process, from receiving a question to forming a model answer, is fully automated. The system is launched in a realistic environment and initial functional tests are conducted.

5. The accuracy of the model's response, speed of operation, and logical consistency are evaluated using key metrics. A practical test is conducted with the participation of users to determine their level of satisfaction. The identified shortcomings are eliminated based on the analysis, and the model is further optimized.

Conclusion

This study clearly demonstrated the possibility of creating a practical system that simplifies the admission process based on Mini-LLM. The developed system helps to quickly and clearly answer applicants' questions, reducing unnecessary time spent by commission employees. The easy operation of the model allows it to be used without requiring complex technical conditions. The results obtained serve as a solid basis for further improving this approach in the future and gradually introducing it into the real admission process.

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