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| **Project Title** | Automated Multiple-Choice Question Generation Using Llama Model | | |
| **Project Code** | AIS411 | **Course Name** | Natural Language Processing |
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| **Problem Summary** | The manual creation of multiple-choice questions (MCQs) is time-consuming and inefficient, especially for large volumes of educational text. This research addresses the challenge of automating MCQ generation from unstructured text in PDF documents. While current automated question generation models show promise, they often struggle with complex document formats and require extensive fine-tuning for domain-specific contexts. The proposed solution aims to develop an efficient system that extracts text from PDF documents, segments it into coherent chunks, and generates relevant MCQs using a fine-tuned Llama 3B language model. The fine-tuning process leverages datasets like SQuAD and RACE to enhance the model's ability to generate accurate and contextually appropriate questions. The goal is to provide a scalable, automated tool that improves the relevance and quality of generated MCQs, making it a valuable resource for educators and e-learning platforms. | | |
| **Methodology** | Our methodology involves a three-phase approach:  1. text extraction  2. chunking  3. question generation.  First, the system extracts text from PDF documents using the pdfplumber library to capture unstructured content accurately. Non-textual elements, such as page numbers and headers, are removed during pre-processing to ensure clean text data. In the second phase, the extracted text is segmented into smaller, coherent chunks of approximately 500 characters. These chunks are designed to preserve contextual integrity, enabling the model to generate relevant questions. In the final phase, the Llama 3B model, pre-trained on large text corpora, is fine-tuned using question-answer datasets like SQuAD and RACE to improve question accuracy. Fine-tuning is achieved using Parameter-Efficient Fine-Tuning (PEFT) techniques such as Low-Rank Adaptation (LoRA), which optimize memory usage while maintaining high model performance. Evaluation metrics like ROUGE, BLEU, and BLEURT are used to assess the quality and relevance of the generated MCQs. | | |
| **Achievements and Skills Gained** | 1. Mastery of Natural Language Processing techniques for text extraction and segmentation 2. Practical experience in fine-tuning large language models using domain-specific datasets. 3. Proficiency in using tools like Hugging Face's transformers library 4. Development of evaluatoin metrics (ROUGE, BLEU, BLEURT) to assess model performance | | |

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| **Main Results** |  |
| **Discussion and Conclusion** | The experimental results demonstrate that fine-tuning the Llama 3B model on domain-specific datasets significantly improves the quality of generated MCQs. The fine-tuned model outperforms the base model in terms of precision, recall, and semantic relevance, as evidenced by the substantial increases in ROUGE, BLEU, and BLEURT scores. These findings suggest that integrating domain-specific knowledge during fine-tuning enhances the model's ability to produce contextually accurate and meaningful questions. The automated MCQ generation system offers a scalable solution for e-learning platforms, enabling educators to generate high-quality assessments with minimal manual effort. However, further improvements in dataset diversity and model efficiency are recommended for future iterations. |
| **References** | Text. |
| **Future Work and Suggestions** | Future work should focus on expanding the dataset diversity to improve the system's performance across different topics and document types. Exploring more efficient fine-tuning strategies and model architectures could optimize both memory usage and performance, allowing for real-time MCQ generation. Additionally, deploying the system in a user-friendly platform that supports multi-language educational content would broaden its applicability. |
| **Group Photo** |  |