

Abstract / Introduction

Aim

This research explores the use of Artificial Intelligence (AI) and Large Language Models (LLMs) such as GPT, RAG, and GPT-4, in education. Our research primarily focuses on using Artificial Intelligence and Large Language Models like GPT-4 and Llama to generate customized quiz questions for learners. Through a review of academic databases like Google Scholar, ACM Digital Library, and IEEE Xplore, the study highlights how large language models (LLMs) can significantly change and improve the way we teach and learn.

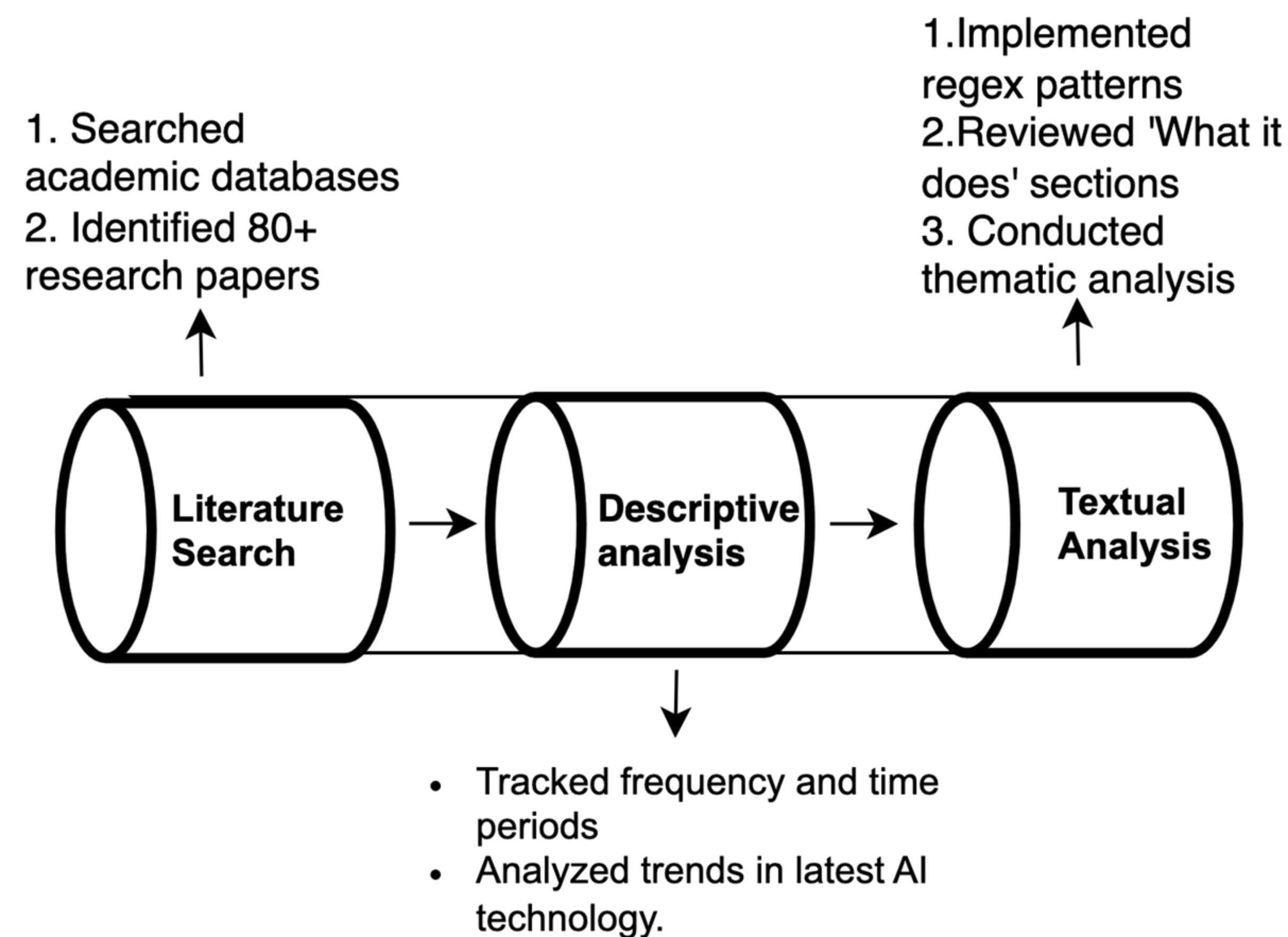
Methodology

The methodology involved a comprehensive analysis of existing literature to discern current trends and technology gaps in AI-driven quiz generation. Key papers were examined, highlighting advancements in LLMs for generating multiple-choice and short-answer questions, and assessing their quality and relevance in educational contexts.

Gaps Identified

The research aims to identify the gaps in these papers and the use of LLMs for creating personalized educational tools. It was observed that while models like GPT-4 show promise in generating accurate questions, there remains an underutilization of RAG models and self-operating tools that could further enhance the personalization of learning experiences.

Methodology



Papers Highlights

Title	GPT-4	GPT-3	GPT-2	BERT
Generating Multiple Choice Questions for Computing Courses using Large Language Models	✓	✓		
Short Answer Questions Generation by Fine-Tuning BERT and GPT-2			✓	✓
Assessing the Quality of Student-Generated Short Answer Questions Using GPT-3		✓		
Reading Comprehension Quiz Generation using Generative Pre-trained Transformers		✓		
Leveraging GPT-3 as a question generator in Swedish for High School teachers		✓		

Research aims

- **Conducting Literature Review for Technology Trends:** We review current academic papers and websites to identify the latest technologies used in developing intelligent quiz generators.
- **Comprehensive Literature Review:** Thoroughly examining academic materials to spot current trends, useful tools, and any gaps in how LLM is used in education.

Identified Problems

- A one-size-fits-all approach that doesn't consider their unique learning paths or current understanding.
- Existing research does not focus on quiz generators that adapt to the users' individual learning behaviors and patterns, a key feature for personalized learning.
- Most existing quiz generators lack the integration of advanced AI, specifically Large Language Models (LLMs), which are capable of learning and adapting to students' behaviors and patterns.

Used Keywords For Literature Search

Used keywords:

- "Artificial Intelligence"
- "Large Language Models"
- "Quiz Generation"
- "GPT"
- "Education"

Conducted thematic analysis for unexplored areas and future research opportunities.

Top Papers

Title	Year	Description
Generating Multiple Choice Questions for Computing Courses using Large Language Models	2023	The study shows that GPT-4 is better than GPT-3 at making accurate multiple-choice questions
Short Answer Questions Generation by Fine-Tuning BERT and GPT-2	2021	Fine-tuning AI models like BERT and GPT-2 assists teachers in automatically generating short-answer exam questions.
Assessing the Quality of Student-Generated Short Answer Questions Using GPT-3	2022	Study shows 32% of student-made short answer questions are high-quality; explores GPT-3 for their evaluation.
Reading Comprehension Quiz Generation using Generative Pre-trained Transformers	2022	EduQuiz uses AI like GPT-3 to create quizzes, enhancing learning practice and student engagement.
Leveraging GPT-3 as a question generator in Swedish for High School teachers	2023	Study assesses GPT-3's help in question creation for Swedish High School teachers via expert interviews.

Identified Solutions for Quiz Generation

- Conducting SWOT Analysis for AI Tools in Education
- Integrating AI Tools in Teaching Practices
- Developing Comprehensive Quiz Generation Tools
- Leveraging Student-Generated Content
- Utilizing Advanced LLMs for MCQ Generation
- Fine-Tuning AI for Specific Domains

Gaps Identified

Gaps within the use of Large Language Models (LLMs) and AI for creating a quiz-based learning AI engine for college students, we need to consider the following:

LLM Usage: GPT-4 is less used, and free LLM's like Llama, Falcon, Mistral not used.

RAG Models: They make quizzes more relevant, but aren't used much yet. They could help fill the gap between creating content and understanding context.

Self-Operating Tools: Not much used, but these tools could change quiz experiences to fit each person's learning style and subjects.

Different Types of Content: Quizzes don't often use pictures, sound, or videos, even though these could help a lot.

Checking How Good AI Quizzes Are: We don't really have strong ways to see if AI quizzes are helping students learn better.

Conclusion

In conclusion, our review of numerous papers highlights a crucial need for innovation in educational quiz generators. Most existing quiz generators don't adequately adapt to and learn from students' behaviors. Recognizing this gap, our goal is to create something distinct - a new LLM-driven quiz generator tool that not only adapts to individual learning styles but also evolves based on student interactions, offering a more personalized and effective learning experience.

Future Research

In the field of education, the way AI is used for teaching and giving feedback isn't very developed yet. In future, there's potential for more research into using simpler, less expensive AI models to generate personalized quizzes with RAG models, which are great for quickly storing and accessing information. Additionally, there's a big opportunity for further research into incorporating different types of content like images and videos into AI educational tools and really testing how effective these tools are in personalized learning and teaching.