

Developing AI Agents for Course Planning and Development

An AI Framework for Academic Module Development
at Teesside University

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Introduction

- Growing complexity in academic module design.
- Need for policy-compliant, pedagogically sound systems.
- AI offers opportunities for automation and quality enhancement.

Objectives



Develop

Develop AI agents tailored for Teesside University's academic standards.

Streamline

Streamline course module planning and development.

Enhance

Enhance module quality.

Research Context



Academic planning is time-consuming and complex.



Teesside University requires modules to follow specific guidelines.



Project aims to alleviate workload and ensure compliance.



Methodology

Dataset
Preparation

Environment
Setup


Fine-tuned
Llama-3.2B-
Instruct using
institutional
data.

Implemented a
Retrieval-
Augmented
Generation
(RAG) pipeline.

Introduced an
agentic
decision-making
layer.

Web user
Interface

Implementation



Data sourced from Teesside's course specification documents.

Prompt Engineering

Fine-tune the pre-trained model using LoRA and 4-bit quantization.

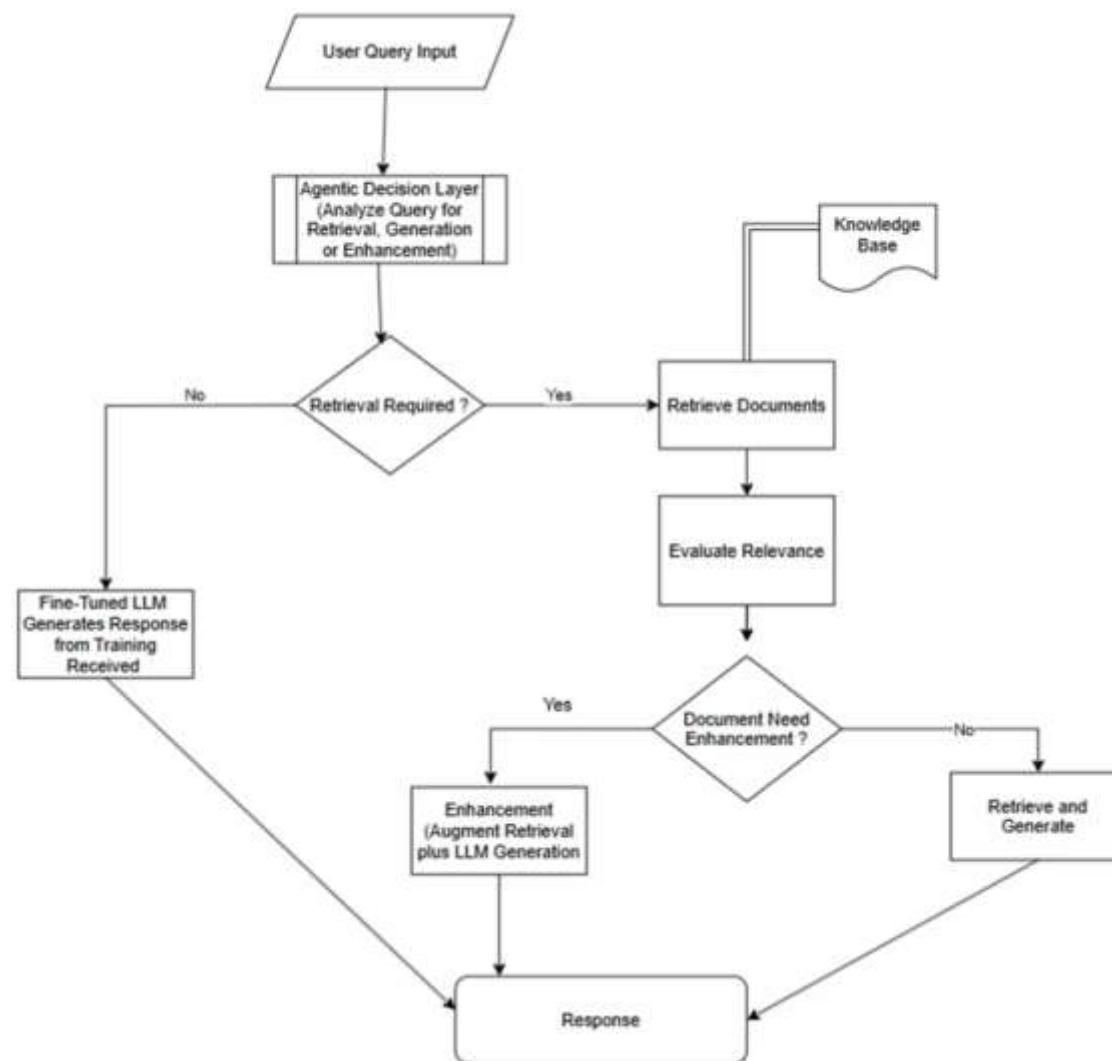
Hybrid search with FAISS (semantic) and BM25 (lexical) retrieval.

Agentic layer decides to retrieve, generate, or enhance responses

User-friendly web interface for querying and content generation.

The Agentic System

Flow Chart showing the Agentic Pipeline



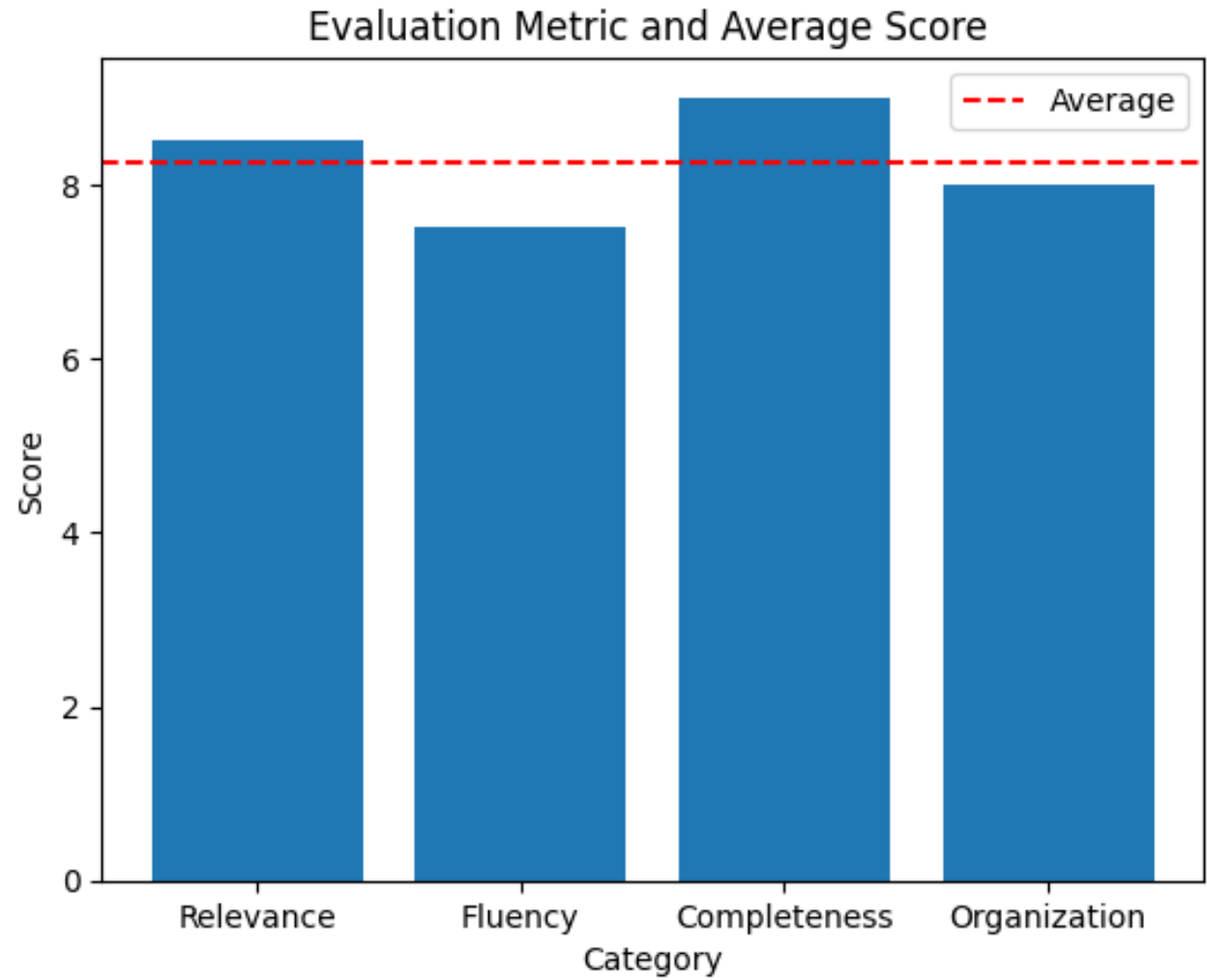
Evaluation Metrics



Metric	Value	Interpretation
Perplexity	2.4800	High Flency
<u>Hits@ 3</u>	1.0000	Efficient Retrieval
Cosine Similarity	0.7806	Strong alignment
Hallucination Rate	0.0000	Factual grounding
BLEU	0.0058	Low n-gram overlap
Rouge-1	0.3128	Moderate unigram recall
Rouge-2	0.1148	Low bigram recall
Rouge-L	0.2275	Moderate longest-sequence overlap

Human Evaluation

- Relevance: 8.5/10
- Fluency: 7.5/10
- Completeness: 9.0/10
- Organization: 8.0/10



Challenges and Limitations

- Limited dataset and synthetic data augmentation.
- Computational constraint.
- Formatting variability in generated outputs.



Future Work

- Expand to full program design and cross-faculty support.
- Integrate reinforcement learning and advanced NLU components.
- Introduce multilingual support and richer templates.



Conclusion



AI agents improve efficiency and consistency in course planning.



Framework aligns content with institutional policies.



Scalable model for broader educational use cases.