Large language model

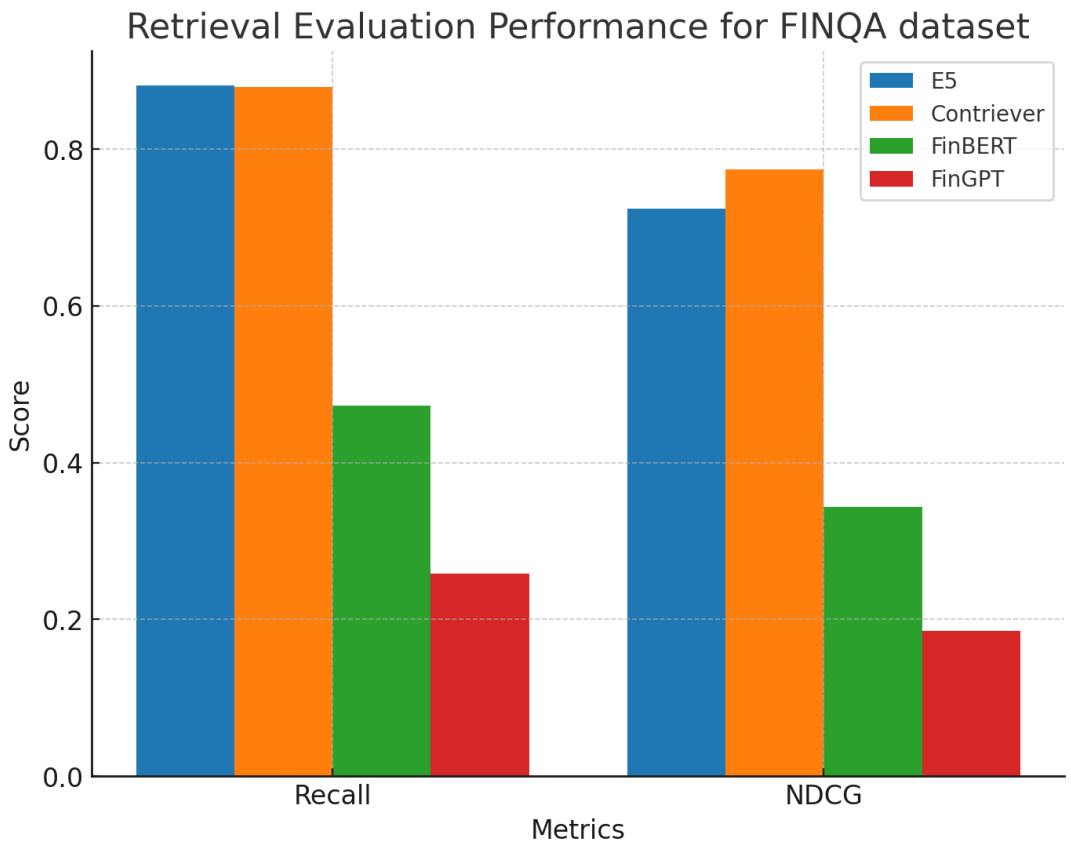
PROGRESS REPORT
03/03/2025

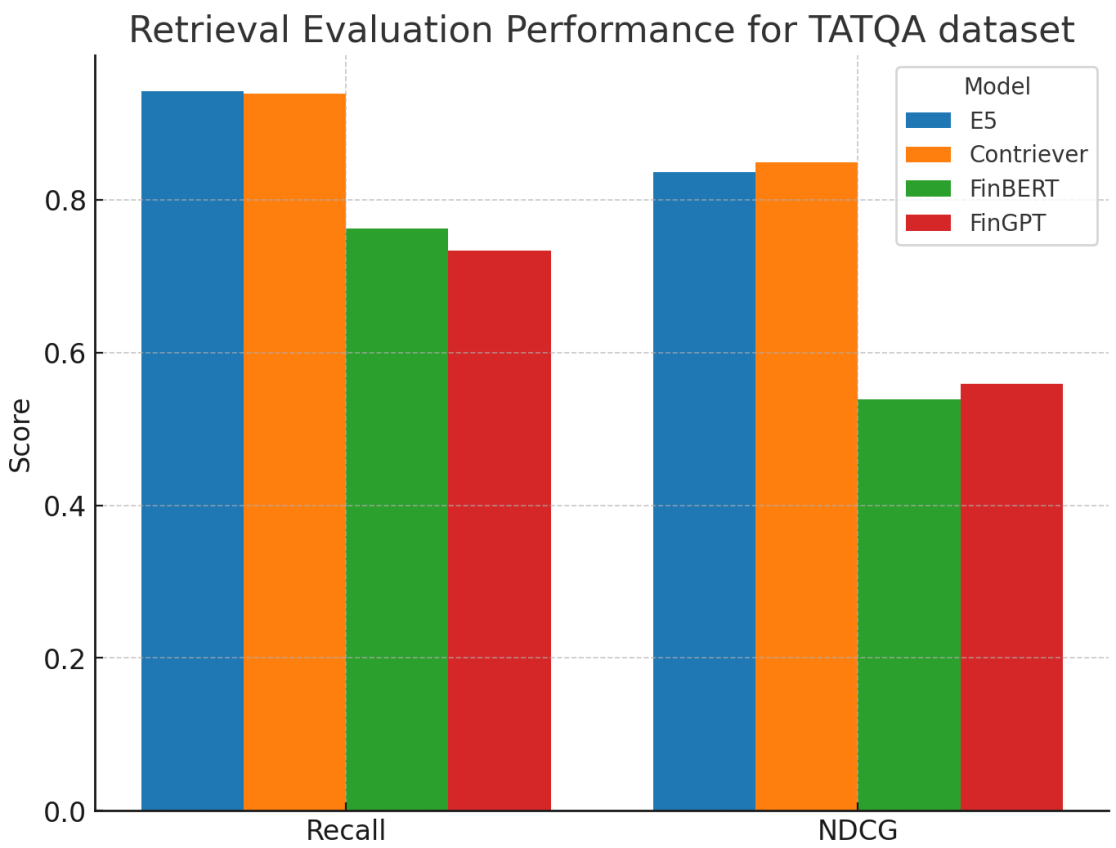
Overview

1. Retrieval study
2. RAG System
3. Explainability
4. Completeness
5. Monitoring

I. Retrieval study

Model Comparison





Model Comparison

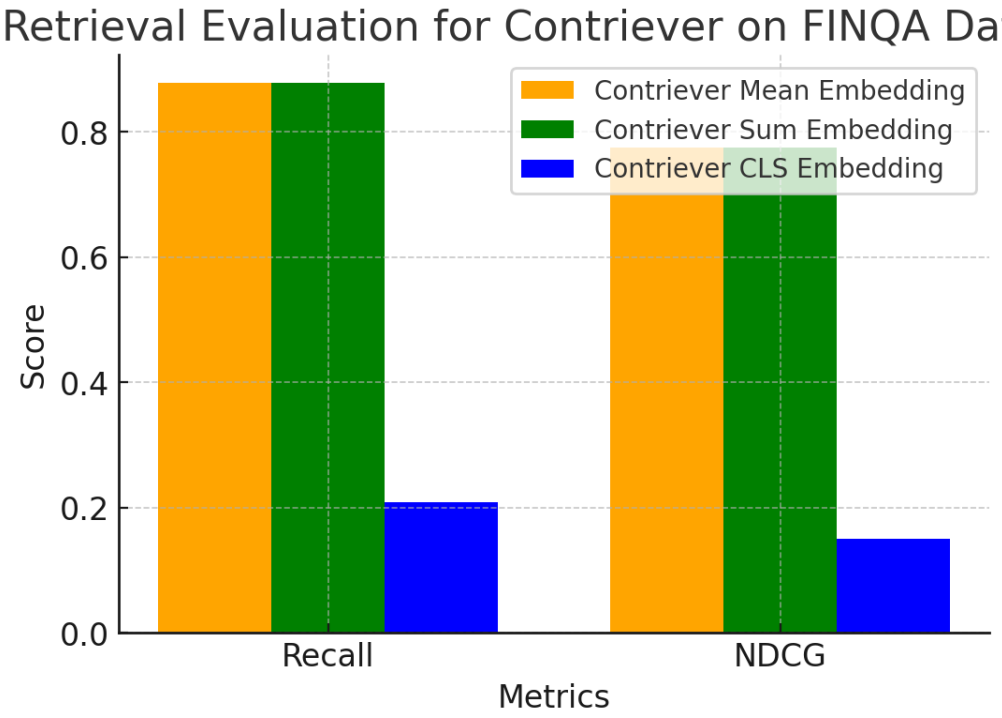
- E5: more params (560M) --> slow but more accurate
- Contriever (110M): Fast but less accurate
- FinBERT (110 M)

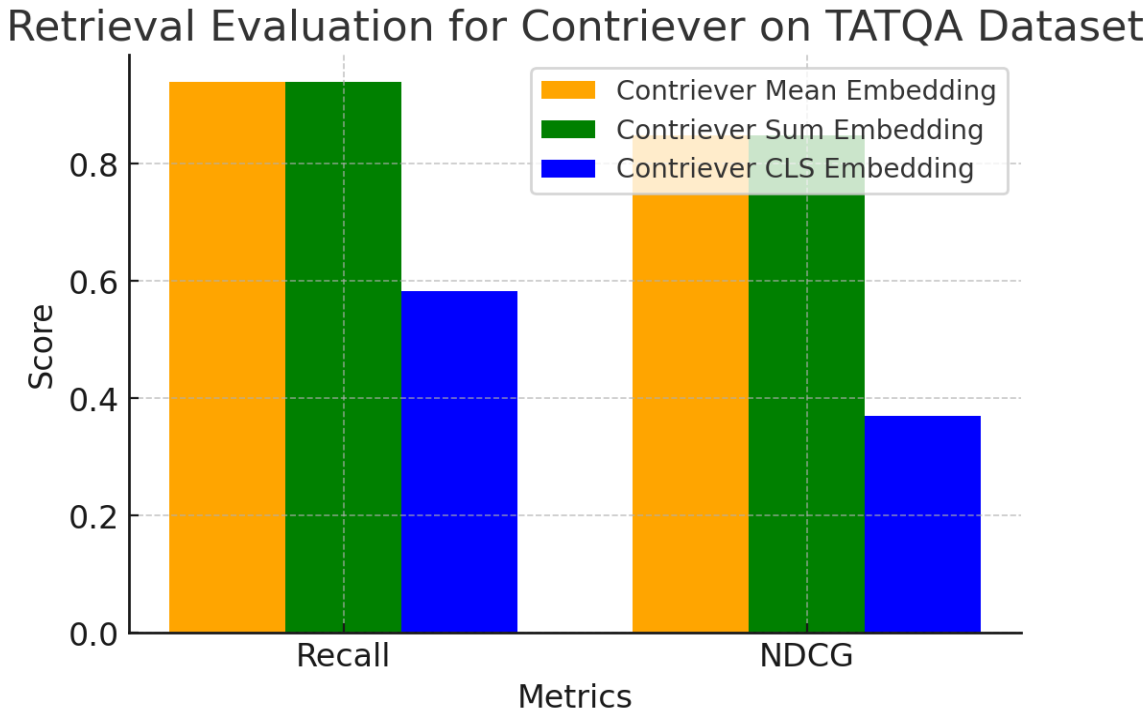
It has been specifically fine-tuned on financial texts for sentiment classification and language understanding, making it effective for retrieval-based QA

- FinGPT (7B) params

FinGPT, on the other hand, is a large generative model trained mainly for financial forecasting and language generation, not retrieval.

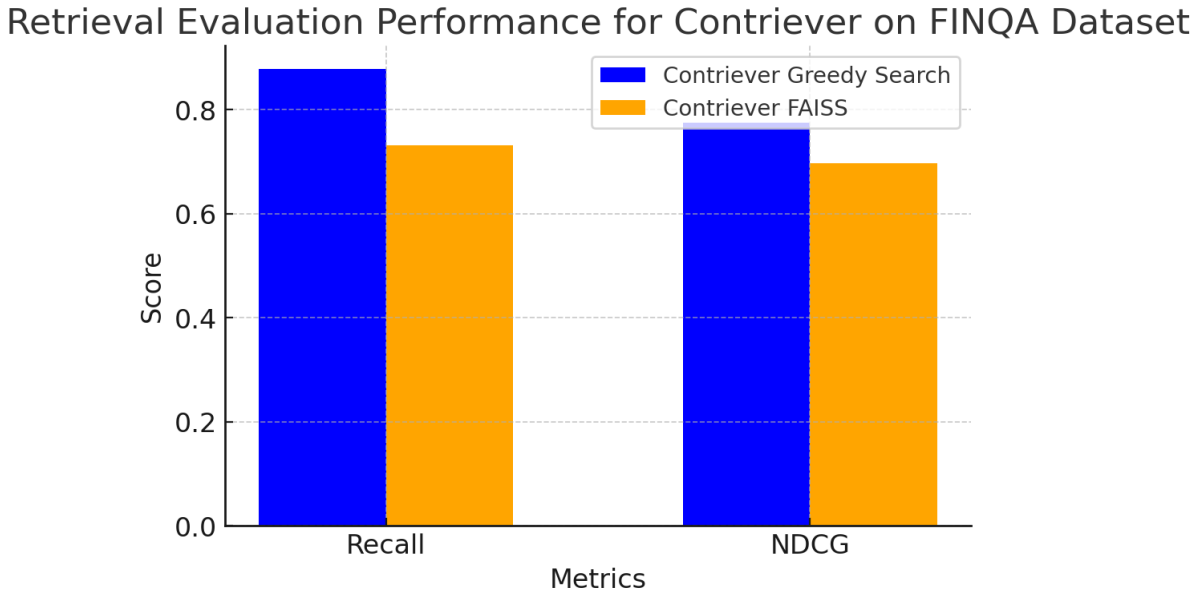
Embedding type



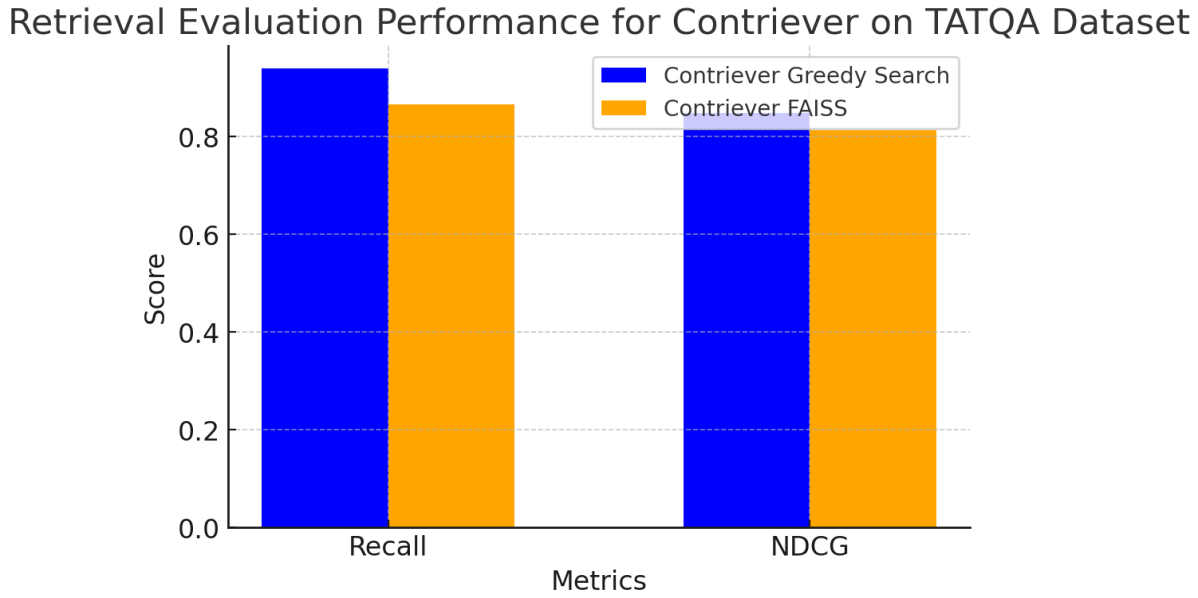


Mean Embedding is taken

Search Method



Greedy: 134.15s
FAISS: 133.97s



Greedy: 129.72s
FAISS: 130.30s

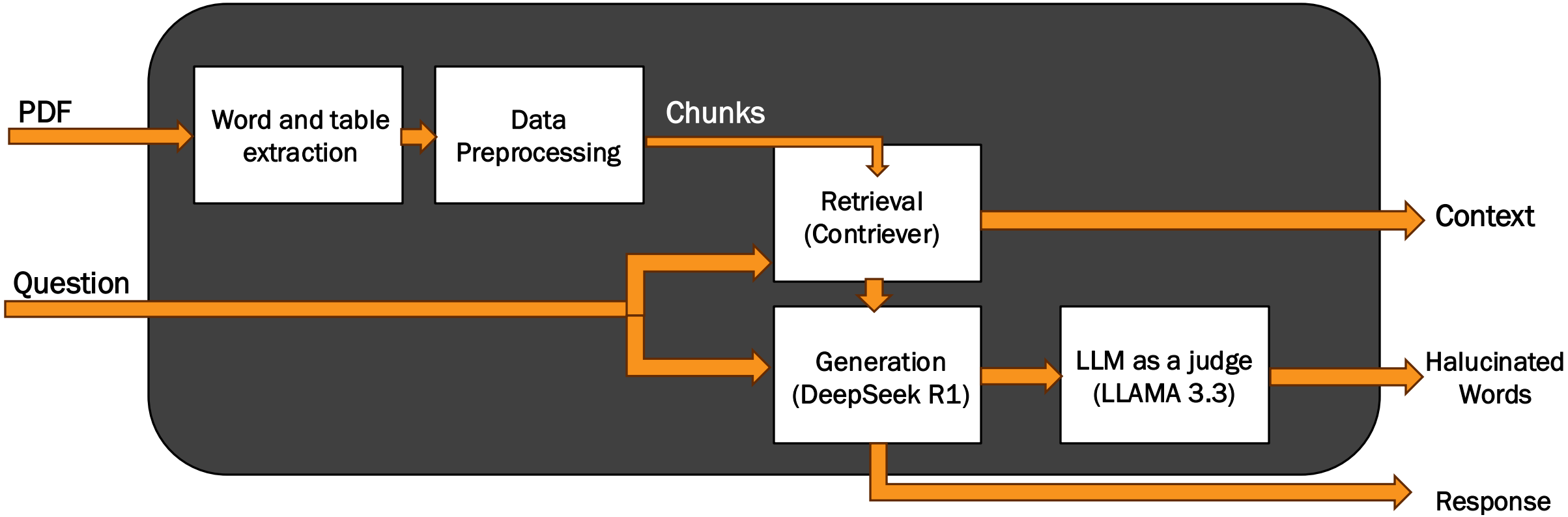
Search Method

Feature	Cosine Similarity (Brute Force)	FAISS (ANN Search)
Accuracy	✅ Exact	⚠️ Approximate
Speed	❌ Slow for large datasets	✅ Fast (sublinear)
Scalability	❌ Poor (>10K docs is slow)	✅ Excellent (>1M docs)
Memory Usage	❌ High (stores all embeddings)	✅ Efficient (uses optimized indexing)

We suppose that the extraction is made based on small number of documents
--> **Greedy Search** is implemented

II. RAG System

Production System



Examples

Question	Context	Answer	Halucinated words
What is the impact of rising interest rates on corporate investments and real estate?	• 'Market Trends The S&P 500 and NASDAQ indices have shown mixed performance, with technology stocks leading gains while energy and traditional industries lagged.' • 'Table 1: S&P 500 and NASDAQ Performance Rising interest rates have affected borrowing costs, influencing real estate and corporate investments.' • 'Asset: Bitcoin | 2023 Start Price: $16,500 | 2023 End Price: $28,400 | % Change: 72.1%' • 'Asset: Ethereum | 2023 Start Price: $1,200 | 2023 End Price: $1,900 | % Change: 58.3%' • 'Index: S&P 500 | 2023 Start: 3,800 | 2023 End: 4,250 | % Change: 11.8%'	I need to figure out the impact of rising interest rates on corporate investments and real estate based on the given context. Let's start by reading through the context carefully. The context mentions that rising interest rates have affected borrowing costs, which influence real estate and corporate investments. That seems like a key point. It also talks about the S&P 500 and NASDAQ performance, noting that technology stocks are doing well while energy and traditional industries ...	[]

Examples

Question	Context	Answer	Halucinated words
What is the impact of rising interest rates on corporate investments and real estate?	• 'Market Trends The S&P 500 and NASDAQ indices have shown mixed performance, with technology stocks leading gains while energy and traditional industries lagged.' • 'Table 1: S&P 500 and NASDAQ Performance Rising interest rates have affected borrowing costs, influencing real estate and corporate investments.' • 'Asset: Bitcoin | 2023 Start Price: $16,500 | 2023 End Price: $28,400 | % Change: 72.1%' • 'Asset: Ethereum | 2023 Start Price: $1,200 | 2023 End Price: $1,900 | % Change: 58.3%' • 'Index: S&P 500 | 2023 Start: 3,800 | 2023 End: 4,250 | % Change: 11.8%'	I need to figure out the impact of rising interest rates on corporate investments and real estate based on the provided context. Let me start by reading through the context carefully. The context mentions that the S&P 500 and NASDAQ indices have had mixed performance, with tech stocks doing well while energy and traditional industries are lagging. There's a table that says rising interest rates have affected borrowing costs, which in turn influences real estate .... However, tech stocks, such as those on the NASDAQ, may experience resilience due to...	['However, tech stocks, such as those on the NASDAQ, may experience resilience due to']

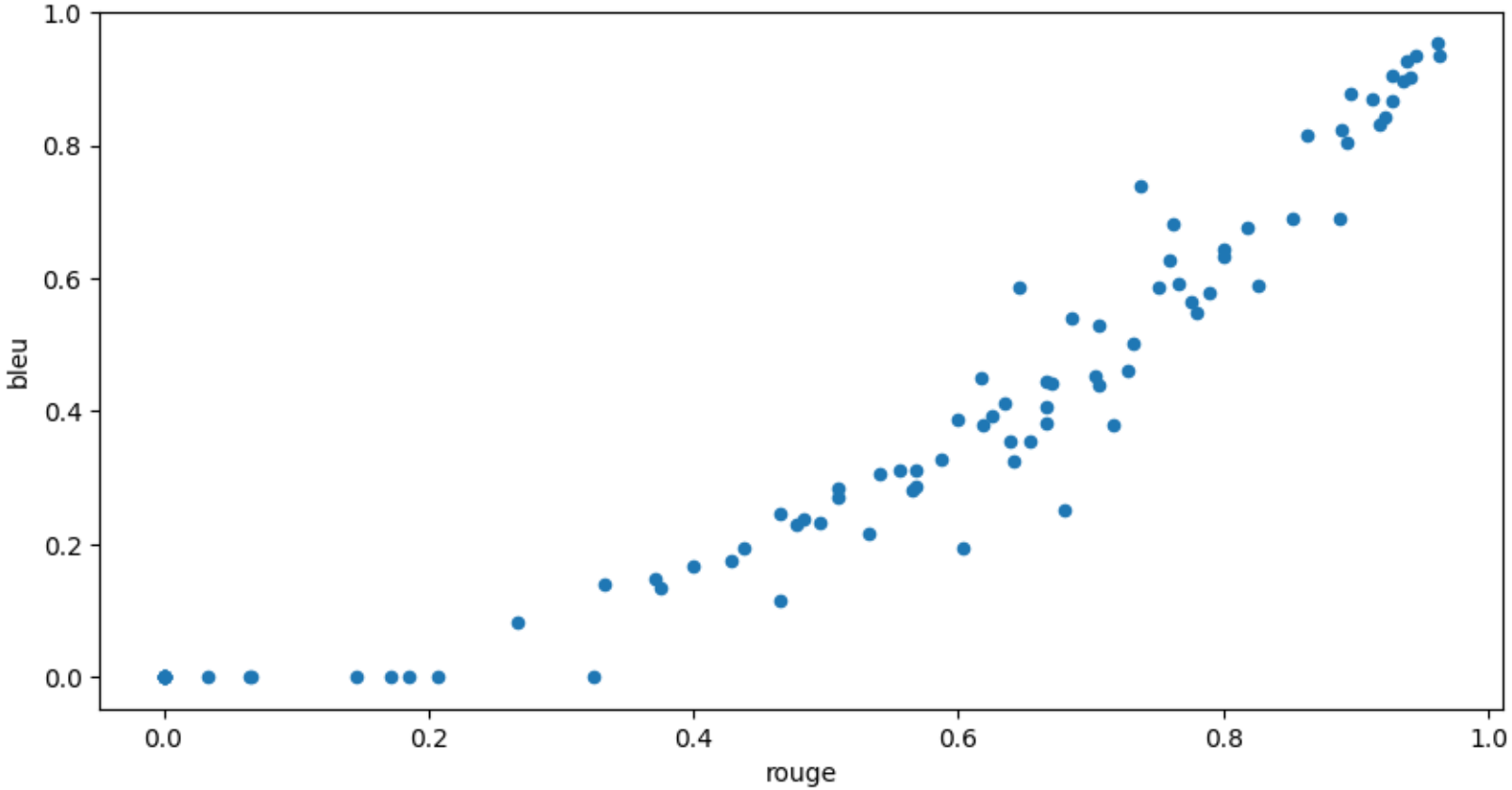
Examples

Question	Context	Answer	Halucinated words
How did the S&P 500 and NASDAQ indices perform in 2023?	• 'Asset: Bitcoin | 2023 Start Price: $16,500 | 2023 End Price: $28,400 | % Change: 72.1%' • 'Index: S&P 500 | 2023 Start: 3,800 | 2023 End: 4,250 | % Change: 11.8%' • 'Market Trends The S&P 500 and NASDAQ indices have shown mixed performance, with technology stocks leading gains while energy and traditional industries lagged. • 'Asset: Ethereum | 2023 Start Price: $1,200 | 2023 End Price: $1,900 | % Change: 58.3%' • 'Table 2: Cryptocurrency Performance in 2023 Cryptocurrencies and blockchain-based assets have gained traction.'	Alright, let's break down the user's query. They're asking about the performance of the S&P 500 and NASDAQ indices in 2023. They've provided some context, so I need to extract the relevant information from that. First, looking at the context, I see specific numbers for the S&P 500. It started at 3,800 and ended at 4,250, with an 11.8% ... This suggests that the NASDAQ likely outperformed the S&P 500, consistent with its focus on high-growth sectors Additionally, the context highlights strong performance in the cryptocurrency market, with Bitcoin and Ethereum....	['The summary mentions that the NASDAQ likely outperformed the S&P 500, which is an interpretation rather than a direct fact from the original context.']

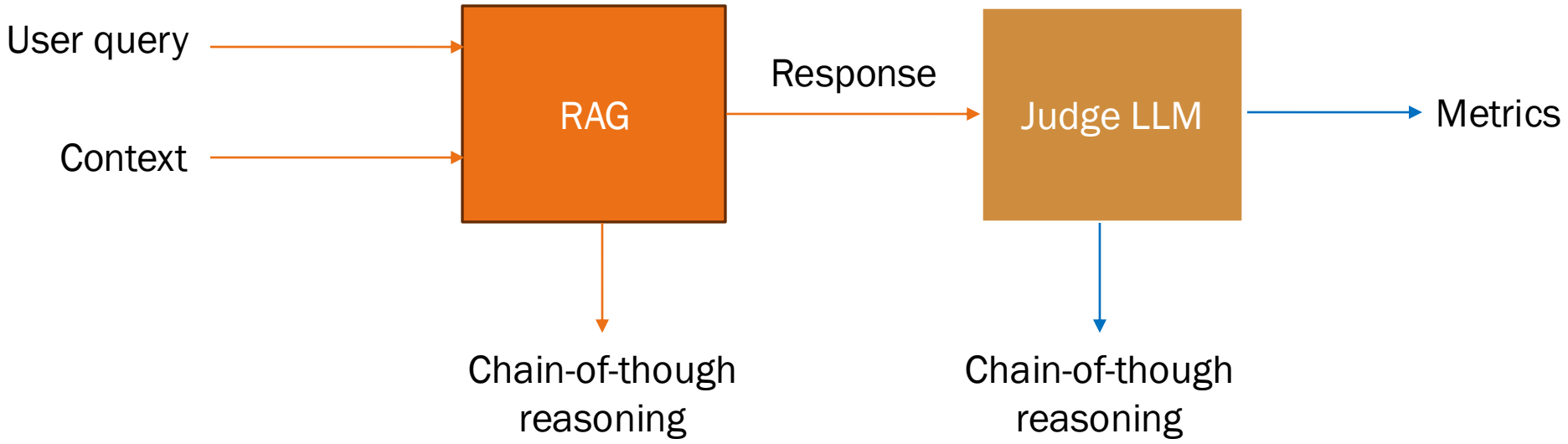
III. Explainability

Hallucination justification on RAGTruth using BLEU/ROUGE

- Methodology
  - Ask the judge model for hallucination segment



Protocol for explainability



IV. Completeness

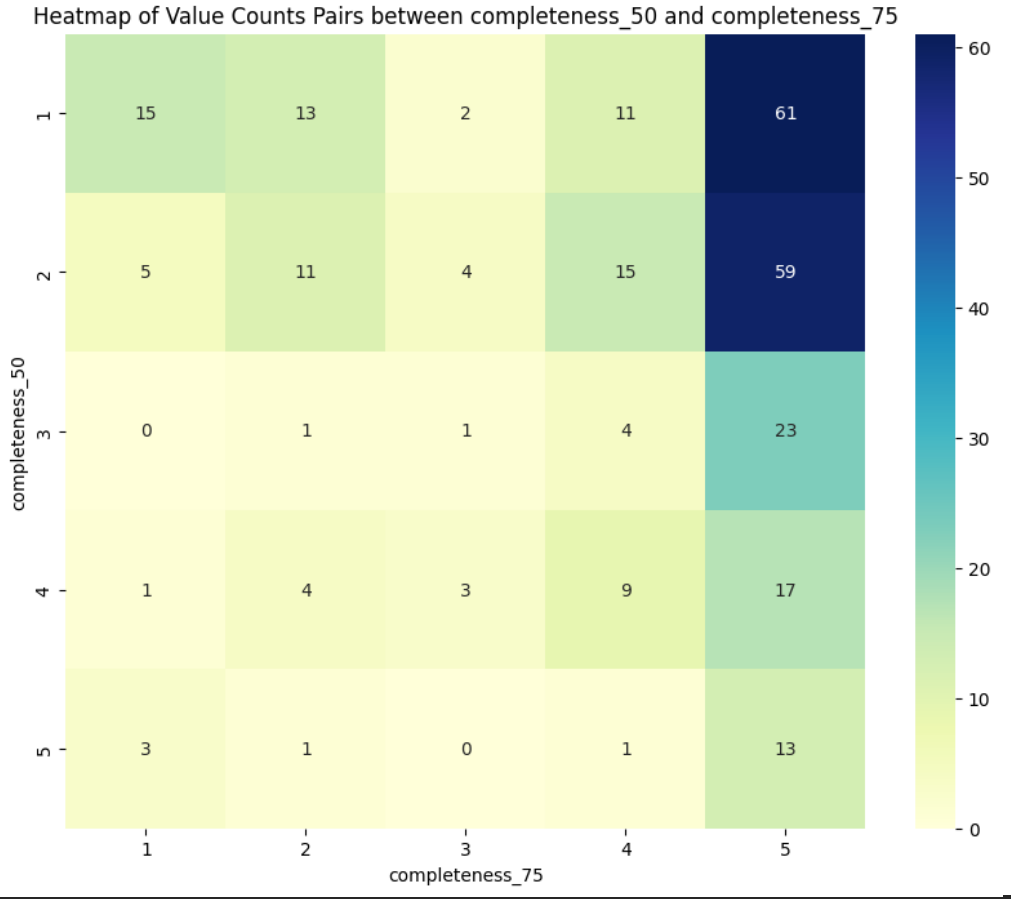
Completeness study for TAT-QA

- Defined completeness based on 5 levels

- Methodology:
  - Take a an already complete benchmarked element in the dataset

  - Mask random tokens

  ⟹ Evaluate the completeness



V. Monitoring

Calibrated set [

Predictor models, LLM-as-a-judge
$-\ f(x) = \{c: argmax\ p(y = c|x)\}$

Use a calibration set $\{(x_1, y_1) \ldots (x_n, y_n)\}$ in order to estimate confidence interval up to some degree of error

- We define a risk $R(y_i, f(x_i))$, a risk level λ and the quantile associated with it α,
  $$P(R(y_i, f(x_i)) \leq \lambda) \geq 1 - \alpha$$

- We estimate the risk levels $\widehat{\lambda_\alpha}$ on the calibration set for a fixed α do that for several values of $\alpha \in [0.01, 0.05, 0.1, 0.5]$.

- In production we can use to evaluate the predictor action-making process by quantifying the nearest confidence interval.

VI. Appendix