

# Faithfulness

## Instructors

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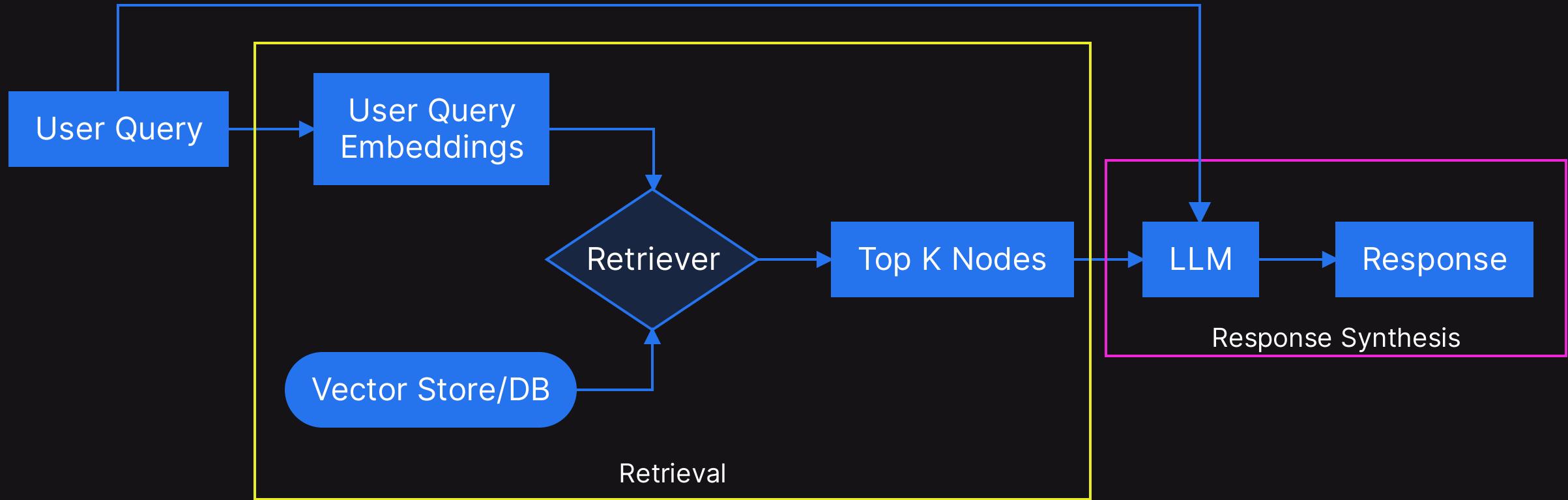
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# Evaluation Metrics

- Retriever Evaluation Metrics
  - Hit rate
  - Mean Reciprocal Rank (MRR)
- Response Evaluation Metrics
  - **Faithfulness**
  - Relevancy
  - Correctness
  - Semantic Similarity
  - Guideline

# Response Synthesis



# Faithfulness

The **Faithfulness** metric evaluates whether an LLM's response accurately reflects the provided context, countering the model's tendency to generate unfounded answers.

# Faithfulness

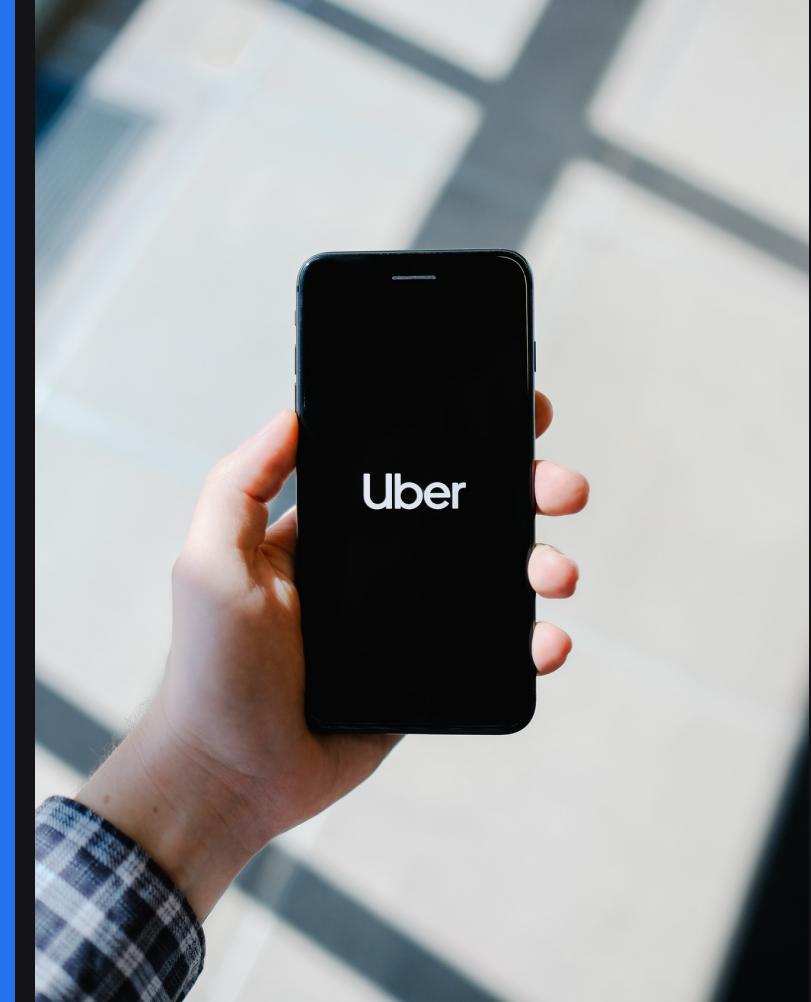
*Several key factors influence Uber's revenue growth. Market expansion into untapped regions, strategic partnerships with businesses, and continuous technological innovations are driving forces. Additionally, user engagement, customer loyalty programs, and effective marketing strategies play pivotal roles in sustaining revenue growth. Understanding and optimizing these factors contribute significantly to Uber's overall financial success.*



# Faithfulness

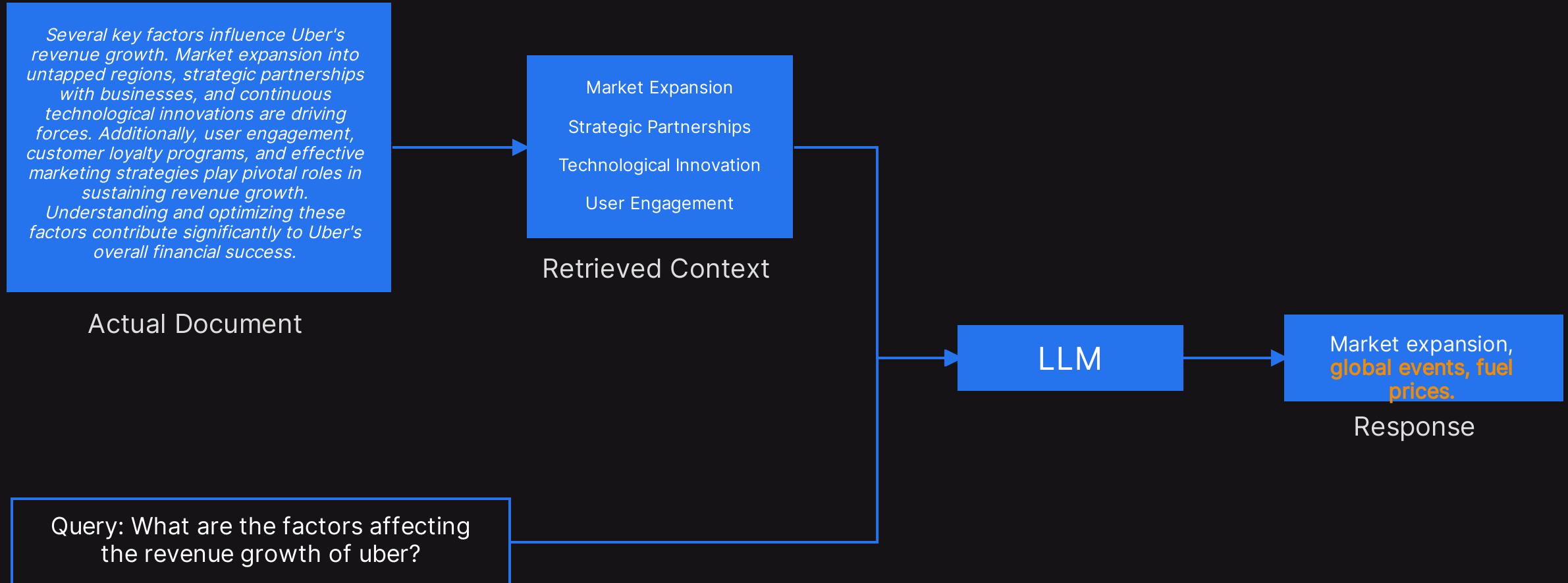
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Query: What are the factors affecting the revenue growth of uber?

# Faithfulness



# Faithfulness

Faithfulness evaluates whether the Response is supported by the context or not.

```
from llama_index.core.evaluation import FaithfulnessEvaluator
```

# Calculating Faithfulness Score

$$\text{Faithfulness score} = \frac{|\text{Number of claims in the generated answer that can be inferred from given context}|}{|\text{Total number of claims in the generated answer}|}$$

## Hint

**Question:** Where and when was Einstein born?

**Context:** Albert Einstein (born 14 March 1879) was a German-born theoretical physicist, widely held to be one of the greatest and most influential scientists of all time

**High faithfulness answer:** Einstein was born in Germany on 14th March 1879.

**Low faithfulness answer:** Einstein was born in Germany on 20th March 1879.

- Measures the factual consistency of the generated answer against the given context
- Calculated from answer and retrieved context
- Answer is scaled to (0,1) range. Higher the better
- Generated answer is regarded as faithful if all the claims made in the answer can be inferred from the given context

# Calculating Faithfulness Score: Example

$$\text{Faithfulness score} = \frac{|\text{Number of claims in the generated answer that can be inferred from given context}|}{|\text{Total number of claims in the generated answer}|}$$

## Hint

**Question:** Where and when was Einstein born?

**Context:** Albert Einstein (born 14 March 1879) was a German-born theoretical physicist, widely held to be one of the greatest and most influential scientists of all time

**High faithfulness answer:** Einstein was born in Germany on 14th March 1879.

**Low faithfulness answer:** Einstein was born in Germany on 20th March 1879.

- Steps for calculation of Faithfulness Score:
  - Step 1: Break the generated answer into individual statements.
    - Statement 1: "Einstein was born in Germany."
    - Statement 2: "Einstein was born on 20th March 1879."
  - Step 2: For each of the generated statements, verify if it can be inferred from the given context.
    - Statement 1: Yes
    - Statement 2: No
  - Step 3: Use the formula to calculate faithfulness.

$$Faithfulness = 1/2 = 0.5$$

# Factors to improve Faithfulness

- Large Language Model
- RAG-Assisted Fine Tuning (RAFT)

# Thank You

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