

RAG Evaluation - Reciprocal Rank (RR) & Mean Reciprocal Rank (MRR)

Given Data

Retrieved Documents

Rank	Document	Relevant?
1	The Great Wall of China is visible from space	✗ No
2	China has the largest population in the world	✗ No
3	The Great Wall of China is a UNESCO World Heritage site	✓ Yes
4	Beijing is the capital of China	✗ No

Relevant Document

"The Great Wall of China is a UNESCO World Heritage site." ✓

Position: Rank 3

Reciprocal Rank (RR) Computation

The relevant document appears at rank 3.

Formula:

$$RR = \frac{1}{\text{rank of first relevant doc}} = \frac{1}{3} \approx 0.333$$



Mean Reciprocal Rank (MRR) - Extension to Multiple Queries

When evaluating multiple queries, compute RR for each query and average them:

$$\text{MRR} = \frac{1}{N} \sum_{i=1}^N \text{RR}_i$$

Example MRR Computation (3 Queries)

Query	Rank of Relevant Doc	RR
Query 1	3	1/3 ≈ 0.333
Query 2	1	1.0
Query 3	Not found	0

Calculation:

$$\text{MRR} = \frac{\frac{1}{3} + 1 + 0}{3} = \frac{1.333}{3} \approx 0.444$$



Final Results

Metric	Value
Reciprocal Rank (RR)	1/3 ≈ 0.333
Mean Reciprocal Rank (MRR) (Example over 3 queries)	0.444