

TD06 - Information Retrieval and Algorithms

Third Year ISIL - University of M'Sila

Exercise 01: Precision and Recall

A system retrieves 10 documents for a query. Among them, 6 are relevant. The total number of relevant documents in the collection is 15.

1. Compute the **Precision**.
2. Compute the **Recall**.

Reminder:

$$Precision = \frac{\text{Relevant Retrieved}}{\text{Retrieved}} \quad Recall = \frac{\text{Relevant Retrieved}}{\text{Relevant}}$$

Exercise 02: F-Measure

Using the results from Exercise 01:

1. Compute the **F1-score**.

$$F1 = \frac{2 \times Precision \times Recall}{Precision + Recall}$$

Exercise 03: Precision at k

A ranked list of retrieved documents is given below:

Rank	Relevant (1=yes, 0=no)
1	1
2	0
3	1
4	1
5	0
6	1
7	0
8	1

1. Compute Precision@1, Precision@3, Precision@5.
2. Compute Recall@5 if the total number of relevant documents is 6.

Exercise 04: Average Precision (AP)

Using the ranking from Exercise 03:

1. Compute the precision at each rank where a relevant document appears.
2. Compute the **Average Precision (AP)**.

Reminder:

$$AP = \frac{1}{R} \sum Precision@k$$

where R is the total number of relevant documents.

Exercise 05: Mean Average Precision (MAP)

Assume two queries with the following AP values:

- Query 1: AP = 0.75
- Query 2: AP = 0.60

1. Compute the **Mean Average Precision (MAP)**.

$$MAP = \frac{1}{Q} \sum AP_i$$

Exercise 06: Precision-Recall Curve

Consider the following precision-recall values:

Recall	Precision
0.1	1.0
0.3	0.8
0.5	0.7
0.7	0.6
0.9	0.5

1. Plot the Precision-Recall curve.
2. Comment on the system performance.

Exercise 07: System Comparison

Two systems A and B produce the following results:

Metric	System A	System B
Precision	0.8	0.6
Recall	0.5	0.9

1. Which system is better for:
 - Precision-oriented tasks?
 - Recall-oriented tasks?
2. Compute the F1-score for both systems.

Exercise 08: Discussion

Answer briefly:

1. Why is precision important in web search?
2. Why is recall important in medical retrieval systems?
3. What is the limitation of Precision and Recall?