Information Retrieval

Exercise – Winter term 2025/2026

klara.gutekunst@uni-kassel.de

Precision–Recall Curve

Exercise

Given the following two rankings:

System	Topic	Relevance at rank									
		1	2	3	4	5	6	7	8	9	10
D	t_1	👍	👎	👍	👍	👎	👍	👎	👎	👎	👍
D	t_2	👎	👎	👍	👍	👎	👎	👍	👍	👎	👍
E	t_1	👎	👍	👍	👎	👍	👍	👍	👎	👎	👎
E	t_2	👍	👎	👍	👍	👎	👎	👎	👍	👍	👎

Which system is better?

Precision–Recall Curve

Given the following two rankings:

System	Topic	Relevance at rank									
		1	2	3	4	5	6	7	8	9	10
D	t_1	👍	👎	👍	👍	👎	👍	👎	👎	👎	👍
D	t_2	👎	👎	👍	👍	👎	👎	👍	👍	👎	👍
E	t_1	👎	👍	👍	👎	👍	👍	👍	👎	👎	👎
E	t_2	👍	👎	👍	👍	👎	👎	👎	👍	👍	👎

Which system is better?

They achieve equal precision and recall for topics t_1 and t_2.

System	Topic	Precision	Recall
D	t_1	0.5	1.0
D	t_2	0.5	1.0
E	t_1	0.5	1.0
E	t_2	0.5	1.0

Precision–Recall Curve

Given the following two rankings:

System	Topic	Relevance at rank									
		1	2	3	4	5	6	7	8	9	10
D	t_1	👍	👎	👍	👍	👎	👍	👎	👎	👎	👍
D	t_2	👎	👎	👍	👍	👎	👎	👍	👍	👎	👍
E	t_1	👎	👍	👍	👎	👍	👍	👍	👎	👎	👎
E	t_2	👍	👎	👍	👍	👎	👎	👎	👍	👍	👎

Which system is better?

Draw the precision–recall curves.

Precision–Recall Curve

Given the following two rankings:

System	Topic	Relevance at rank									
		1	2	3	4	5	6	7	8	9	10
D	t_1	👍	👎	👍	👍	👎	👍	👎	👎	👎	👍
D	t_2	👎	👎	👍	👍	👎	👎	👍	👍	👎	👍
E	t_1	👎	👍	👍	👎	👍	👍	👍	👎	👎	👎
E	t_2	👍	👎	👍	👍	👎	👎	👎	👍	👍	👎

Which system is better?

Draw the precision–recall curves.

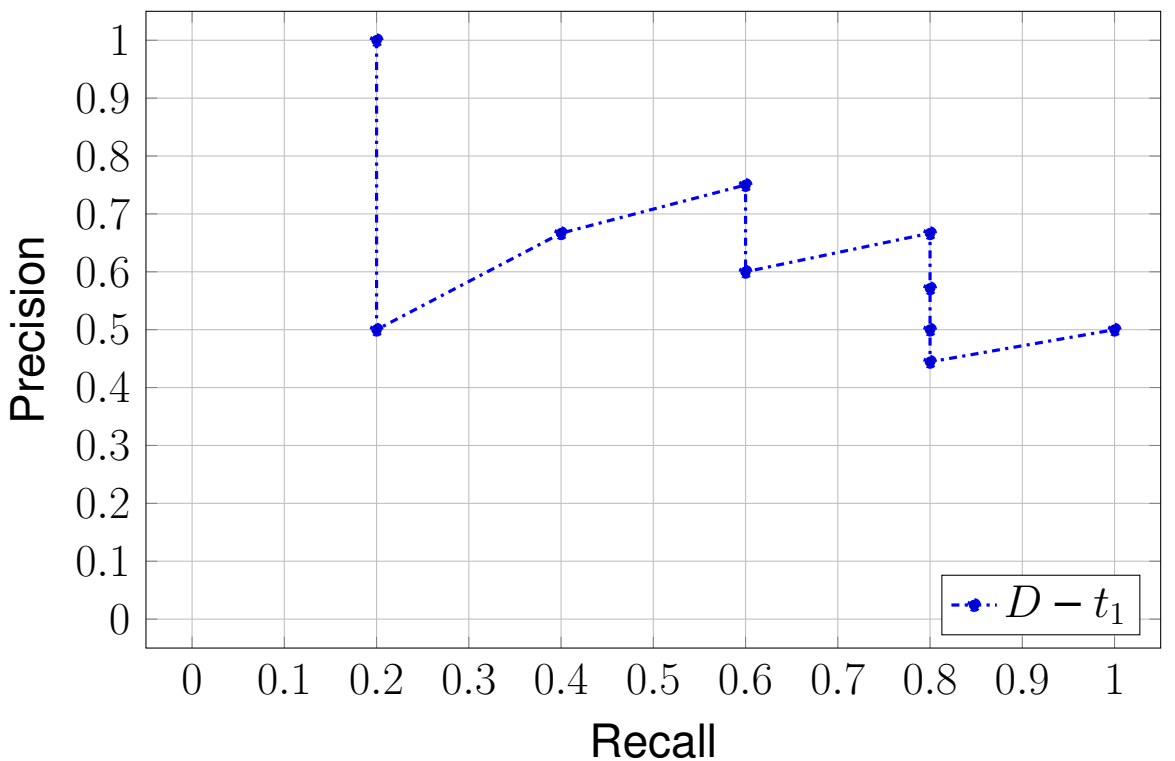
Compute precision and recall at rank k.

Precision–Recall Curve

System	Topic	Relevance at rank									
		1	2	3	4	5	6	7	8	9	10
D	t_1	👍	👎	👍	👍	👎	👍	👎	👎	👎	👍
	precision	1	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{4}{6}$	$\frac{4}{7}$	$\frac{4}{8}$	$\frac{4}{9}$	$\frac{5}{10}$
	recall	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{5}{5}$

Precision–Recall Curve

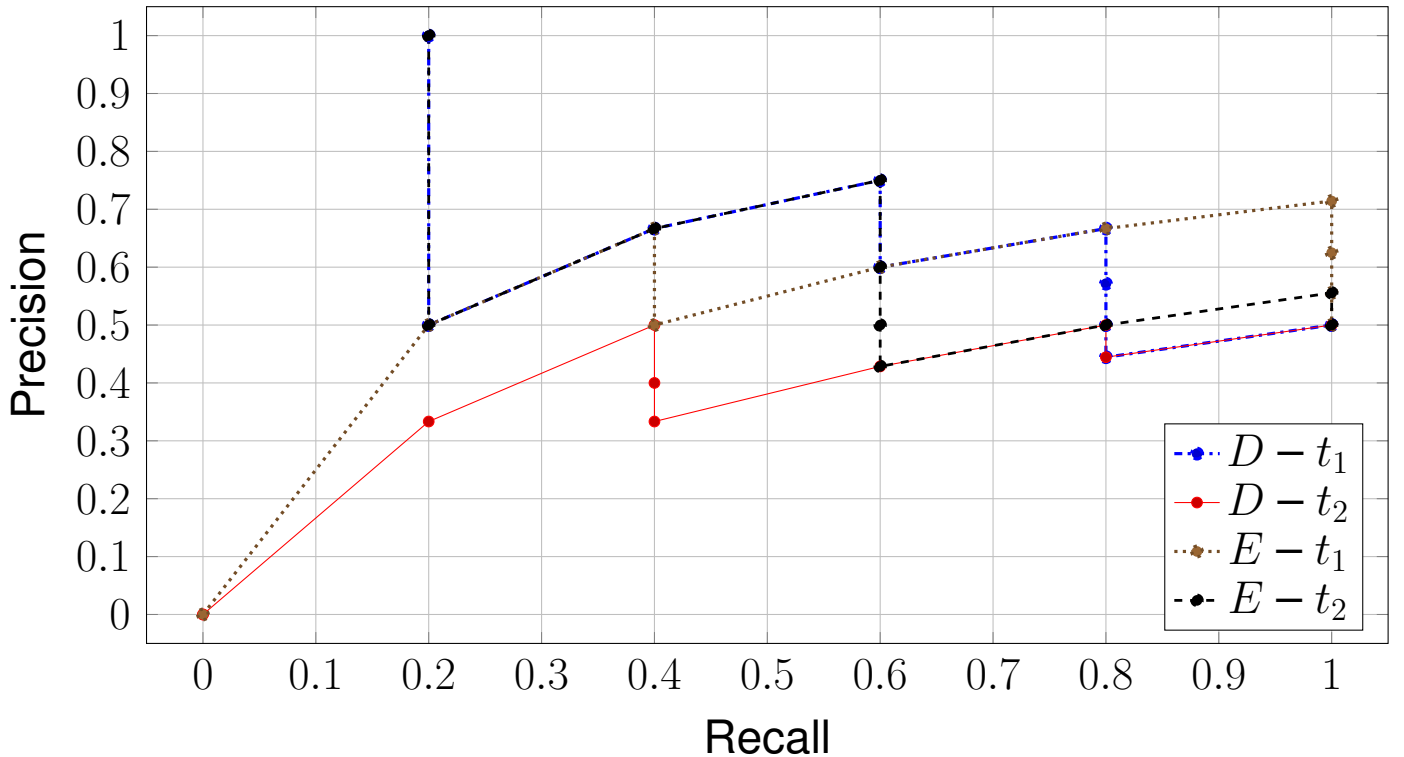
System	Topic	Relevance at rank									
		1	2	3	4	5	6	7	8	9	10
D	t_1	👍	👎	👍	👍	👎	👍	👎	👎	👎	👍
	precision	1	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{4}{6}$	$\frac{4}{7}$	$\frac{4}{8}$	$\frac{4}{9}$	$\frac{5}{10}$
	recall	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{5}{5}$



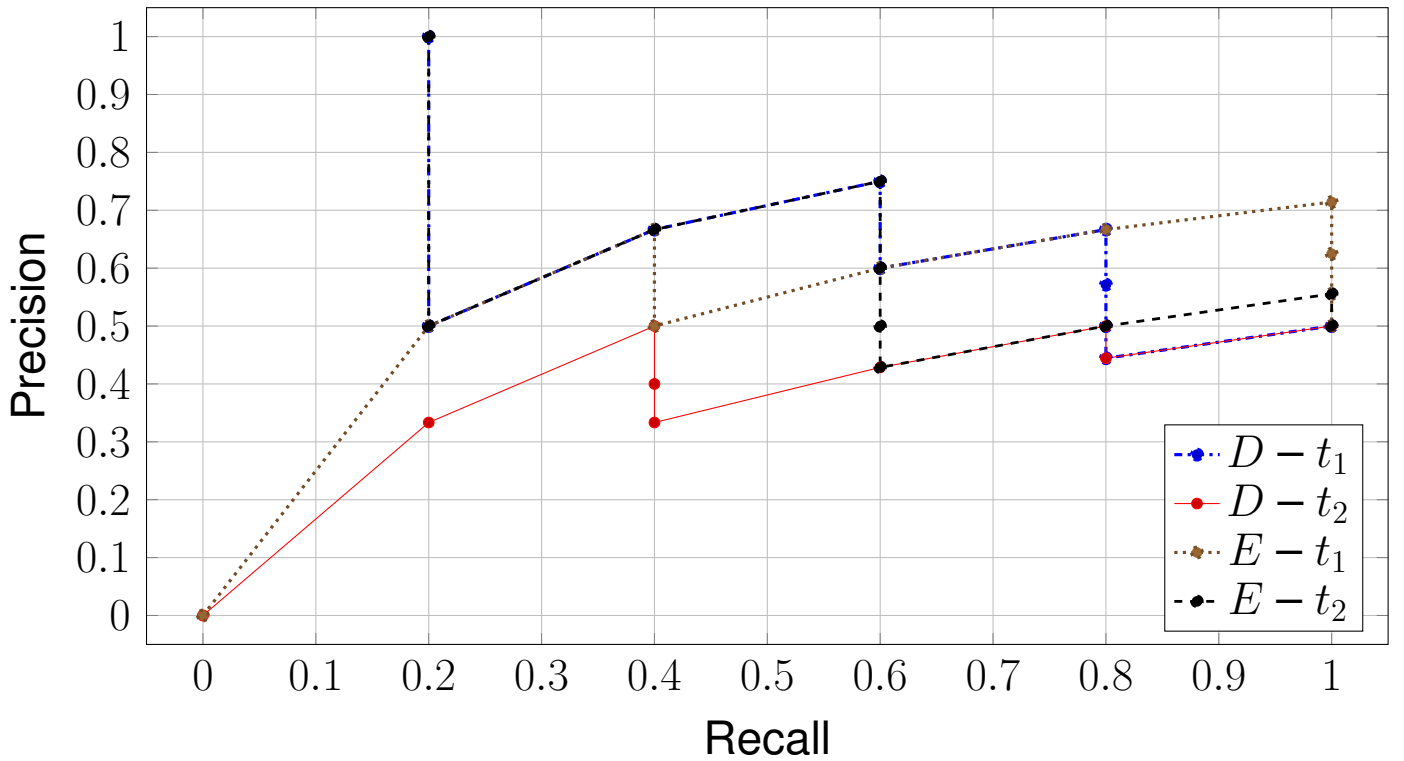
Precision–Recall Curve

System	Topic	Relevance at rank									
		1	2	3	4	5	6	7	8	9	10
D	t_1	👍	👎	👍	👍	👎	👍	👎	👎	👎	👍
	precision	1	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{4}{6}$	$\frac{4}{7}$	$\frac{4}{8}$	$\frac{4}{9}$	$\frac{5}{10}$
	recall	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{5}{5}$
D	t_2	👎	👎	👍	👍	👎	👎	👍	👍	👎	👍
	precision	0	0	$\frac{1}{3}$	$\frac{2}{4}$	$\frac{2}{5}$	$\frac{2}{6}$	$\frac{3}{7}$	$\frac{4}{8}$	$\frac{4}{9}$	$\frac{5}{10}$
	recall	0	0	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{5}{5}$
E	t_1	👎	👍	👍	👎	👍	👍	👍	👎	👎	👎
	precision	0	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{2}{4}$	$\frac{3}{5}$	$\frac{4}{6}$	$\frac{5}{7}$	$\frac{5}{8}$	$\frac{5}{9}$	$\frac{5}{10}$
	recall	0	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{5}$	$\frac{5}{5}$	$\frac{5}{5}$	$\frac{5}{5}$
E	t_2	👍	👎	👍	👍	👎	👎	👎	👍	👍	👎
	precision	1	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{3}{6}$	$\frac{3}{7}$	$\frac{4}{8}$	$\frac{5}{9}$	$\frac{5}{10}$
	recall	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{3}{5}$	$\frac{3}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{5}$	$\frac{5}{5}$

Precision–Recall Curves



Precision–Recall Curves



- Points between the original data points have no direct interpretation
- Best system can be quantified by the larger area under its curve
- Average precision $AP(q, R)$ estimates the area under the uninterpolated precision–recall curve for topic t and query $q \in Q$
- $MAP(Q)$: Average precision-recall curves for different topics

  [“An Introduction to Informaiton Retrieval” (Manning et al.), Section 8.4]