Plotting Precision and Recall
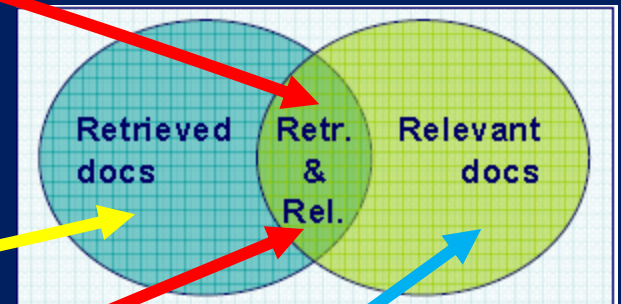
♦ Precision

= No. of relevant documents retrieved

Total no. of documents retrieved

Retrieved docs   Retr. & Rel.   Relevant docs

♦ Recall

= No. of relevant documents retrieved .

Total no. of relevant documents in database

♦ Precision and recall are interrelated

Precision & Recall for a single query
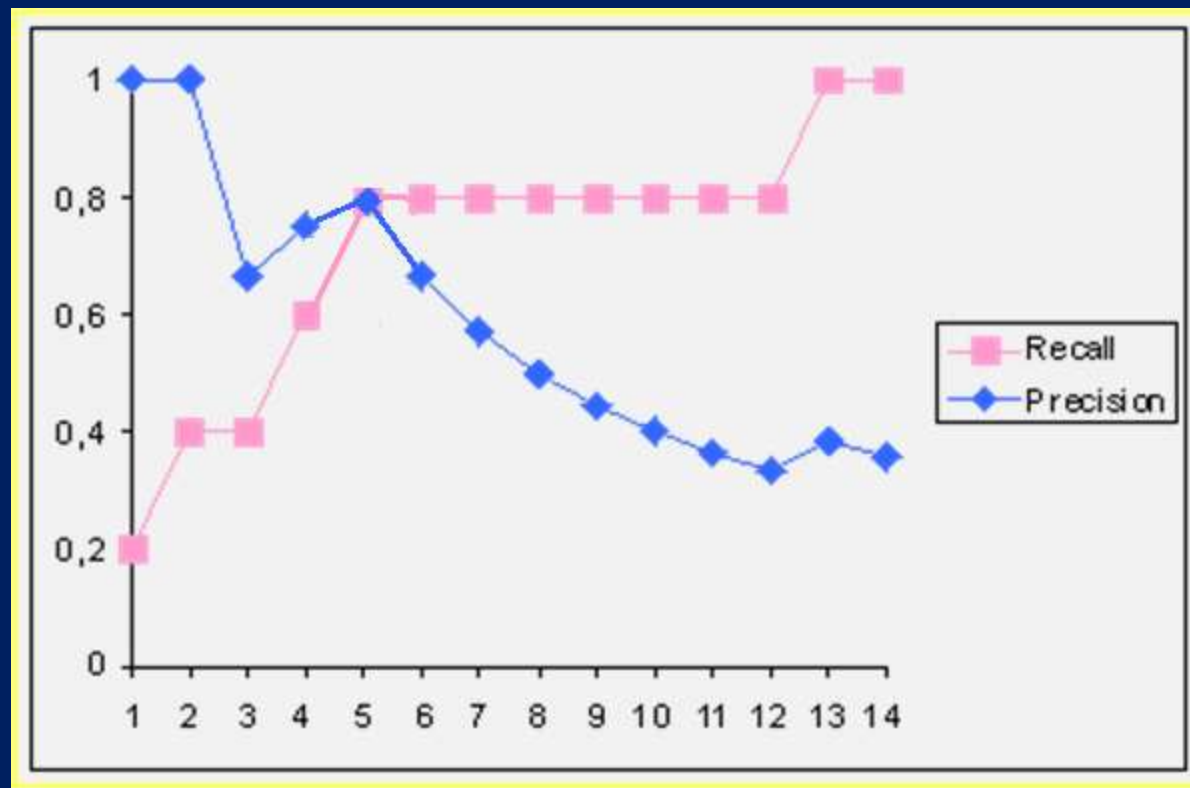
♦ 14 documents: 1,2,4,5 and 13 are relevant

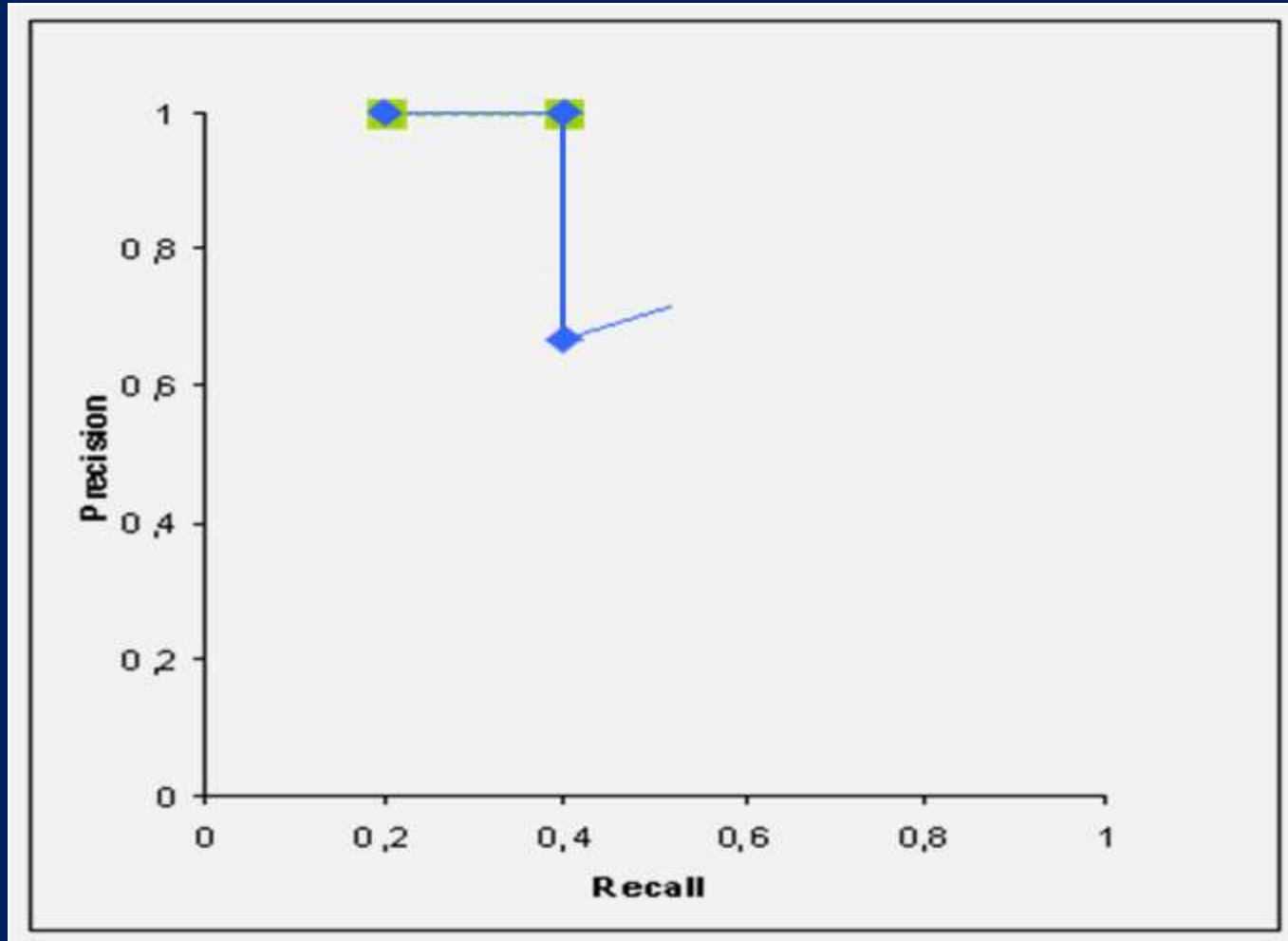| Doc #	Recall	Precision
1	1/5 = 0.2	1/1 = 1
2	2/5 = 0.4	2/2 = 1
3	2/5 = 0.4	2/3 = 0.67
4	3/5 = 0.6	3/4 = 0.75
5	4/5 = 0.8	4/5 = 0.8
6	4/5 = 0.8	4/6 = 0.67
7	4/5 = 0.8	4/7 = 0.57
8	4/5 = 0.8	4/8 = 0.50
9	4/5 = 0.8	4/9 = 0.44
10	4/5 = 0.8	4/10 = 0.40
11	4/5 = 0.8	4/11 = 0.36
12	4/5 = 0.8	4/12 = 0.33
13	5/5 = 1.0	5/13 = 0.38
14	5/5 = 1.0	5/14 = 0.36

Precision & Recall for a single query

♦ 5 documents: 1,2,4,5 and 13 are relevant

ith document retrieved

Precision & Recall for a Single Query

♦ 5 documents: 1,2,4,5 and 13 are relevant

Plotting recall and precision

Single query performance not necessarily representative of system

?!

Implementing Precision & Recall

♦ Common method:

- ♦ For each query, calculate precision at 11 levels of recall (0, 10, … 100%)
- ♦ Average across all queries
- ♦ Average the interpolated values at each recall level
- ♦ Plot precision vs. recall curve

Calculating Precision at Standard Recall Levels

♦   Ranking:

1. Doc. 50 rel
2. Doc. 34 not rel
3. Doc. 45 rel
4. Doc. 8   not rel
5. Doc. 23 not rel
6. Doc. 16 not rel
7. Doc. 63 rel
8. Doc 119 rel

(total 10 relevant docs.)

♦ Recall	&	Precision
10%		100%
10%		50%
20%		67%
20%		50%
20%		40%
20%		33%
30%		43%
40%		50%

Calculating Precision at Standard Recall Levels

♦ Average over all test queries:

$$\text{Precision}_{\text{Rleveli}} = \sum (\text{Precision}_{\text{Rleveli,Q}}/N_{\underline{Q)}}$$

♦ Need to interpolate

  ♦ To determine precision at 0% recall

  ♦ To determine precision at standard levels:

$$P(r_j) = \max_{(rj \leq r \leq rj+1)} P(r)$$

Interpolated Precision Example

Plotting recall and precision

Relevant docs
0123
0132
0241
0256
0299
0311
0324
0357
0399

9 Relevant

Rank	DocID	Recall	Precision at this recall
1	0234	0	
2	0132	0.111	0.5
3	0115	0.111	
4	0193	0.111	
5	0123	0.222	0.4
6	0345	0.222	
7	0387	0.222	
8	0256	0.333	0.375
9	0078	0.333	
10	0311	0.444	0.4
11	0231	0.444	
12	0177	0.444	

Recall level	Interpolated precision
0	0.5
10	0.5
20	0.4
30	0.4
40	0.4
50	0
60	0
70	0
80	0
90	0
100	0

Precision @ 11 points of Recall

Plotting recall and precision

Recall level	Interpolated precision
0	0.5
10	0.5
20	0.4
30	0.4
40	0.4
50	0
60	0
70	0
80	0
90	0
100	0

Recall and precision for a single query

11-point Interpolated Recall-Precision