

HomeWork-1 Report Template

Score of Top Relevant File of a Sample Query for each Retrieval Model

Model	Score
ES (built-in)	14.123
Okapi TF	2.370
TF-IDF	5.452
Okapi BM-25	14.063
Unigram LM with Laplace smoothing	-40.757
Unigram LM with Jelinek-Mercer smoothing	-17.13

Inference on the above results

Retrieval Model Performance

[Highlight the scores more than 0.28]

Model	Average Precision	Precision at 10	Precision at 30
ES (built-in)	0.2930	0.4280	0.3627
Okapi TF	0.2290	0.3880	0.3067
TF-IDF	0.2907	0.4200	0.3640
Okapi BM-25	0.2809	0.3920	0.3560
Unigram LM with Laplace smoothing	0.2316	0.4000	0.2907
Unigram LM with Jelinek-Merce r smoothing	0.2191	0.3400	0.2693

Inference on above retrieval model results

- ES (built-in) and TF-IDF models perform the best among the given models in terms of both average precision and precision at different retrieval levels.
- Okapi BM-25 follows closely behind but with slightly lower scores.
- The other models (Okapi TF, Unigram LM with Laplace smoothing, and Unigram LM with Jelinek-Mercer smoothing) consistently perform lower compared to ES, TF-IDF, and Okapi BM-25 in all metrics, indicating their comparatively lower effectiveness in retrieving relevant documents.

Pseudo-relevance Feedback Improvements[ONLY MS STUDENTS]

[The highlighted scores that indicate an improvement in the average precision score of the model]

1. Result after adding the top 5 distinctive terms to each query.

Model	Average Precision	Precision at 10	Precision at 30
ES (built-in)	0.2618	0.3800	0.3067
Okapi TF	0.2326	0.3480	0.3093
TF-IDF	0.2520	0.3640	0.3040
Okapi BM-25	0.2561	0.3680	0.3000
Unigram LM with Laplace smoothing	0.2441	0.4120	0.3253
Unigram LM with Jelinek-Mercer smoothing	0.2393	0.4000	0.3067

2. Results after adding top 5 significant terms from Elasticsearch aggs to each query.

Model	Average Precision	Precision at 10	Precision at 30
ES (built-in)	0.2284	0.3240	0.3053
Okapi TF	0.2348	0.3960	0.3107
TF-IDF	0.2331	0.3200	0.3067
Okapi BM-25	0.2276	0.3320	0.3053
Unigram LM with Laplace smoothing	0.2238	0.3800	0.3120
Unigram LM with Jelinek-Mercer smoothing	0.2208	0.3680	0.3107

Inference on the above pseudo-relevance results

- Okapi TF:
 - After adding the top 5 distinctive terms to each query, the average precision slightly increases from 0.2290 to 0.2326.
 - After adding the top 5 significant terms from Elasticsearch aggs to each query, the average precision slightly increases from 0.2290 to 0.2348.
- Unigram LM with Laplace smoothing:
 - After adding the top 5 distinctive terms to each query, the average precision increases from 0.2316 to 0.2441.
- Unigram LM with Jelinek-Mercer smoothing
 - Both the distinctive terms and ES aggs increased to 0.2393, 0.2208 from 0.2191 respectively.

Table showing the Query used for Evaluation

Query number	85	59	71	64	98
Original Query	Document will discuss allegations, or measures being taken against, corrupt public officials of any governmental jurisdiction	Document will report a type of weather event which has directly caused at least one fatality in some location.	Document will report incursions by land, air, or water into the border area of one country by military forces of a second country or a guerrilla	Document will report an event or result of politically motivated hostage-taking.	Document must identify individuals or organizations which produce fiber optics equipment.

	worldwide.		group based in a second country.		
Processed Query	alleg corrupt public offici	weather least fatal locat	incurs border area militari forc second guerrilla second	result polit hostag take	fiber optic equip
Processed Query - Pseudo RF (Only MS students)	alleg corrupt public offici ortez ligachev connaughton	weather least fatal locat thunderstorm tornado connel	incurs border area militari forc second guerrilla second dinghi jalalabad namibia contra	result polit hostag take q schramm	fiber optic equip pco cabl lightnet satellit