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HomeWork-1 Report

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

Model	Document ID	Score
ES (built-in)	AP890110-0294	26.369692
Okapi TF	AP890110-0294	1.924913594150447
TF-IDF	AP890110-0294	10.44358642631738
Okapi BM-25	AP890110-0294	39.62667462269669
Unigram LM with Laplace smoothing	AP890403-0007	-44.98794382333474
Unigram LM with Jelinek-Mercer smoothing	AP890913-0129	-18.2251839870762

Inference on the above results :

- Query number 98
- AP890110-0294 appears to be the most relevant document for query 98.
- ES built-in, Okapi BM25, TF-IDF and Okapi TF rank AP890110-0294 highest.

Retrieval Model Performance

[Highlight the scores more than 0.28]

Model	Average Precision	Precision at 10	Precision at 30
ES (built-in)	**0.2950**	**0.4000**	**0.3560**
Okapi TF	0.2510	**0.3960**	**0.3320**
TF-IDF	**0.2934**	0.4040	0.3627
Okapi BM-25	**0.2889**	0.4360	0.3707
Unigram LM with Laplace smoothing	0.2604	**0.3960**	**0.3253**
Unigram LM with Jelinek-Mercer smoothing	0.2237	**0.3440**	**0.3133**

Inference on above retrieval model results

- ES and TF-IDF have the best overall precision across metrics. These appear to be robust and stable top performing retrieval models.
- Okapi BM-25 is best for Precision at 10 and at 30.
- Unigram LMs were not as effective for this data.

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
Okapi TF	0.2663	0.4160	0.3640

Okapi TF score before was 0.2510 and after Pseudo relevance is 0.2663.

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

Model	Average Precision	Precision at 10	Precision at 30
Okapi TF	0.2595	0.3600	0.3347

Inference on the above pseudo-relevance results

Okapi TF score before was 0.2510 and after Pseudo relevance from Elasticsearch aggs is 0.2595.

Table showing the Query used for Evaluation

Query number	71	64	58	94	97
Original Query	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 group based in a second country.	Document will report an event or result of politically motivated hostage-taking.	Document will predict or anticipate a rail strike or report an ongoing rail strike.	Document must identify a crime perpetrated with the aid of a computer.	Document must identify instances of fiber optics technology actually in use.
Processed Query	incurs militari forc guerrilla	hostage tak	rail strike	crime comput	instanc fiber optic technolog
Processed Query - Pseudo RF (Only MS students)	incurs militari forc guerrilla south	hostage tak hostag lebanon unit	rail strike rail union strike	crime comput comput comput chip	instanc fiber optic technolog fiber