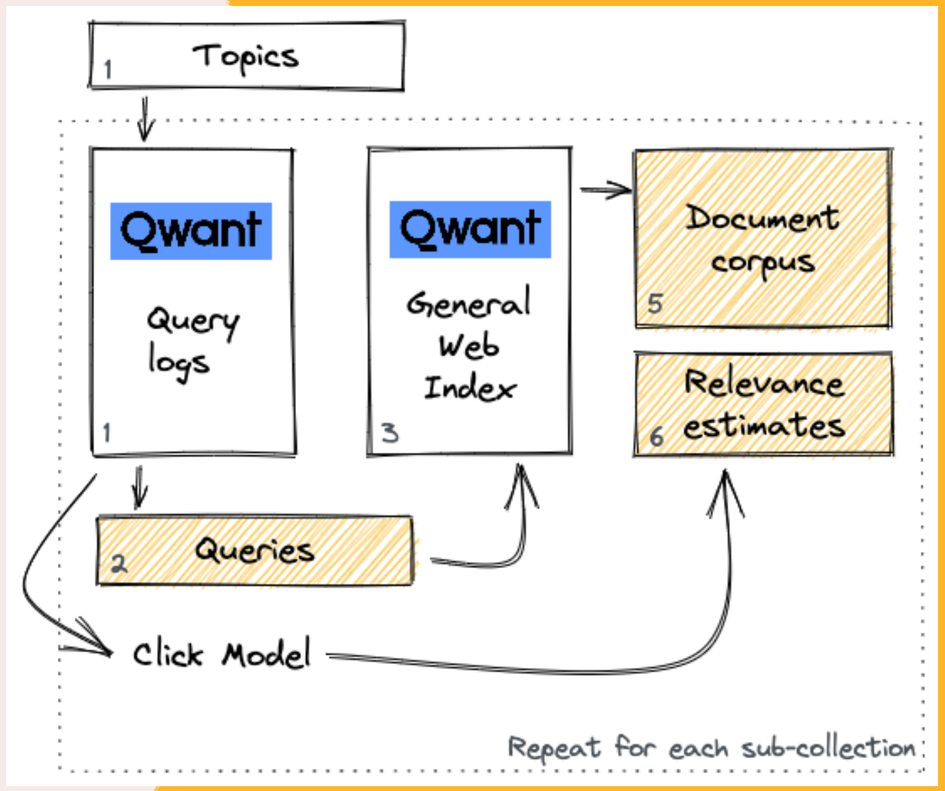
SEUPD@CLEF: DARDS

LongEval



CONTENTS

OUR PATH TO LONGEVAL'S GOALS

1

A starting point

Build a baseline, simple IR system with good performance

2

Continuous improvement

Analysis and ideas turned into experiments, be they good or bad!

3

End of the journey?

Where we've managed to come, results and opportunities

Development of long-term stable IR systems!

WORKFLOW

DOCS:

SPAM PARSING:

INDEXING:

TOKENIZATION

STEMMING & FILTERING

APACHE LUCENE

QUERY*

SEARCHING:

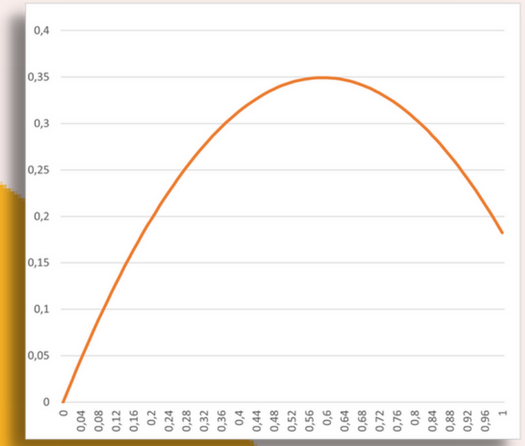
RANKING:**

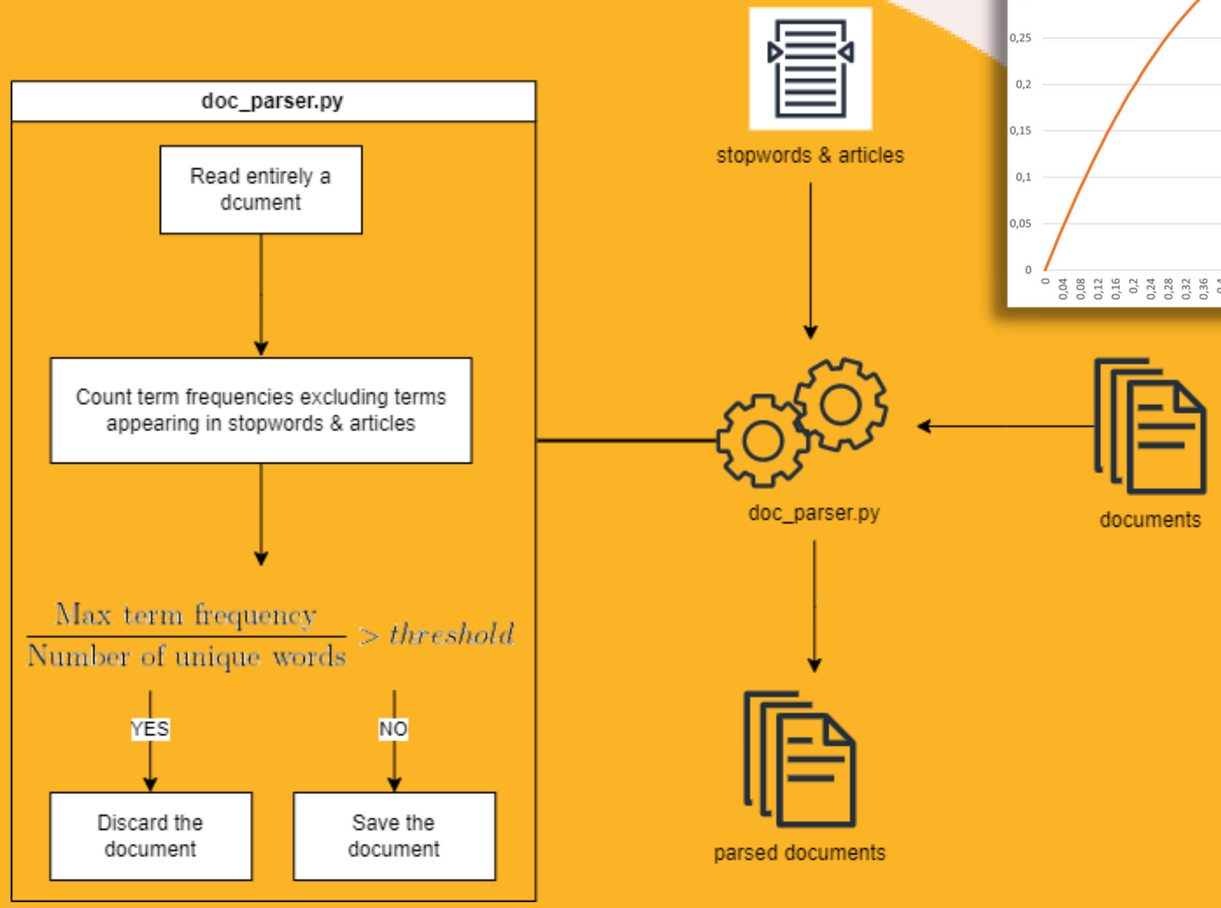
* QUERY TERM BOOSTING

** RERANKING

FIGHT AGAINST SPAM

EXPECTED BEHAVIOUR

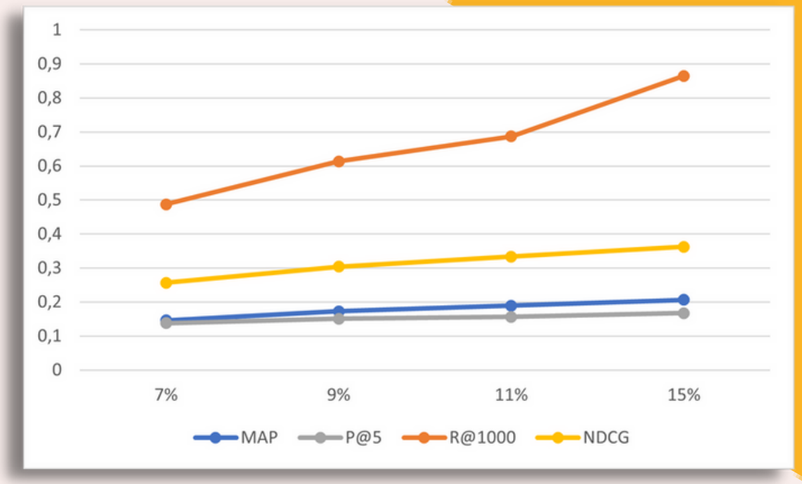




DOCS EXAMPLE

"Panneaux d'indication du code de la route Panneaux de signalisation du code de la route Vous pourrez trouver sur cette page, les images et définitions des différents signaux et panneaux de signalisation du code de la route Code de la route 100% gratuit ! Créez votre compte en 2 min et testez vos connaissances du code de la route Je m'inscris! Code de la route 2022.
© Copyright 2010-2022."

ACTUAL BEHAVIOUR



INPUT'S STRUCTURE

DOCS STRUCTURE

ID

BODY

URL

(optional)

QUERY STRUCTURE

TITLE

(.tsv)

Trec format

ANALYZER & FILTERS

Tokenizer: StandardTokenizer (in all systems)

SHARED

LowerCaseFilter

StopFilter

SynonymGraphFilter

NumberFilter

FRENCH SYSTEMS

ElisionFilter

ASCIIFoldingFilter

FrenchLightStemFilter

ENGLISH SYSTEMS

NGramFilter

ShingleFilter

PorterStemFilter

KStemFilter

NumberFilter: deletes all the number tokens (based on the TypeAttribute token attribute)

Stoplists: custom based on stoplists found online and on index words

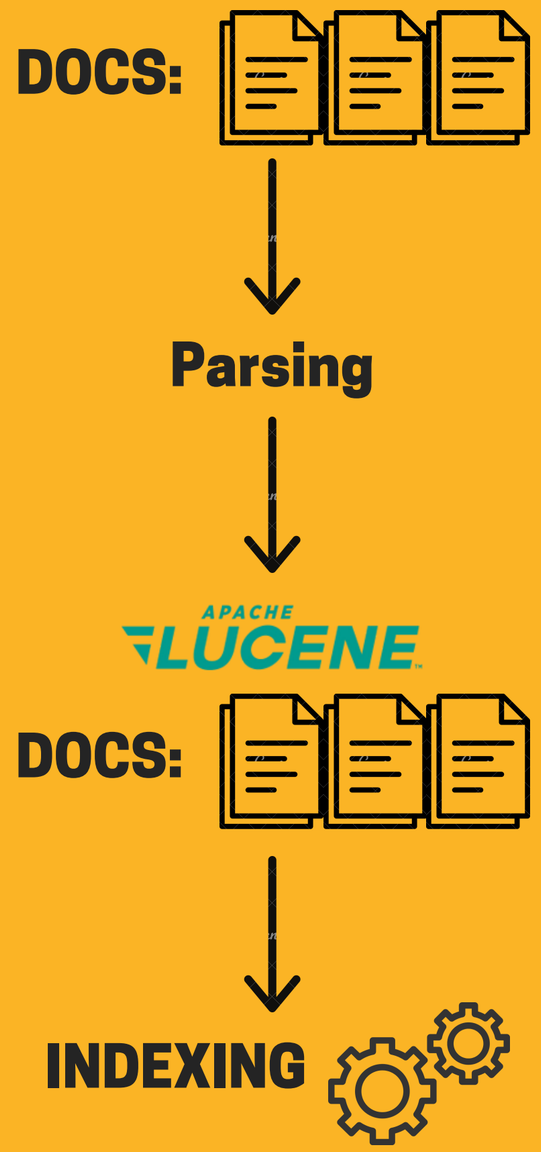
ElisionFilter: removes articles, prepositions and conjunctions usually connected by an apostrophe or hyphen (J'aime)

ASCIIFoldingFilter: converts unicode characters in the first 127 ASCII characters (due to accents and diacritical marks in French)

Indexer

Almost standard indexer:

- **Parses** documents (**Trec** format) and create **index**
- BODY is saved (**rerank**)
- Processing to **delete** **English** documents (when using **French**)



SEARCHER & BOOSTING

QUERY

Without boost

TokenQuery(ies)

STREAM OF TOKENS

BoostQuery(ies)

SHOULD CLAUSE (MUST for URL)

BooleanQuery

SEARCH

INDEX

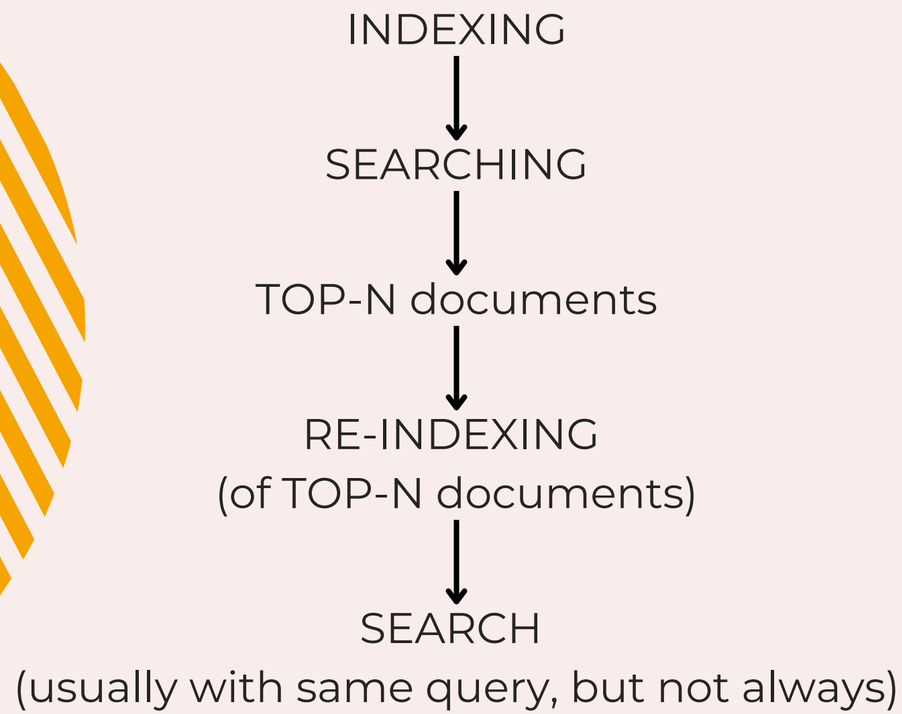
HashMap (term-weight)

TF-IDF like STATISTIC

$$w_i = \left(\frac{ttf_i}{\sum_j ttf_j} \right)^{0.2} \cdot \left(1 + \log \frac{N+1}{n_i+1} \right)$$

RERANK

RERANK by REINDEXING: we tried to change the index statistics to push relevant documents



(usually with same query, but not always)

We reranked the TOP-100 documents , why?

RECALL@100	66.67%
RECALL@200	72.29%
RECALL@500	79.75%
RECALL@1000	84.37%

Since the majority of relevant retrieved documents was in the first 100 documets we kept the number of documents reranked low to try to avoid to index a lot of NOT relevant documents .

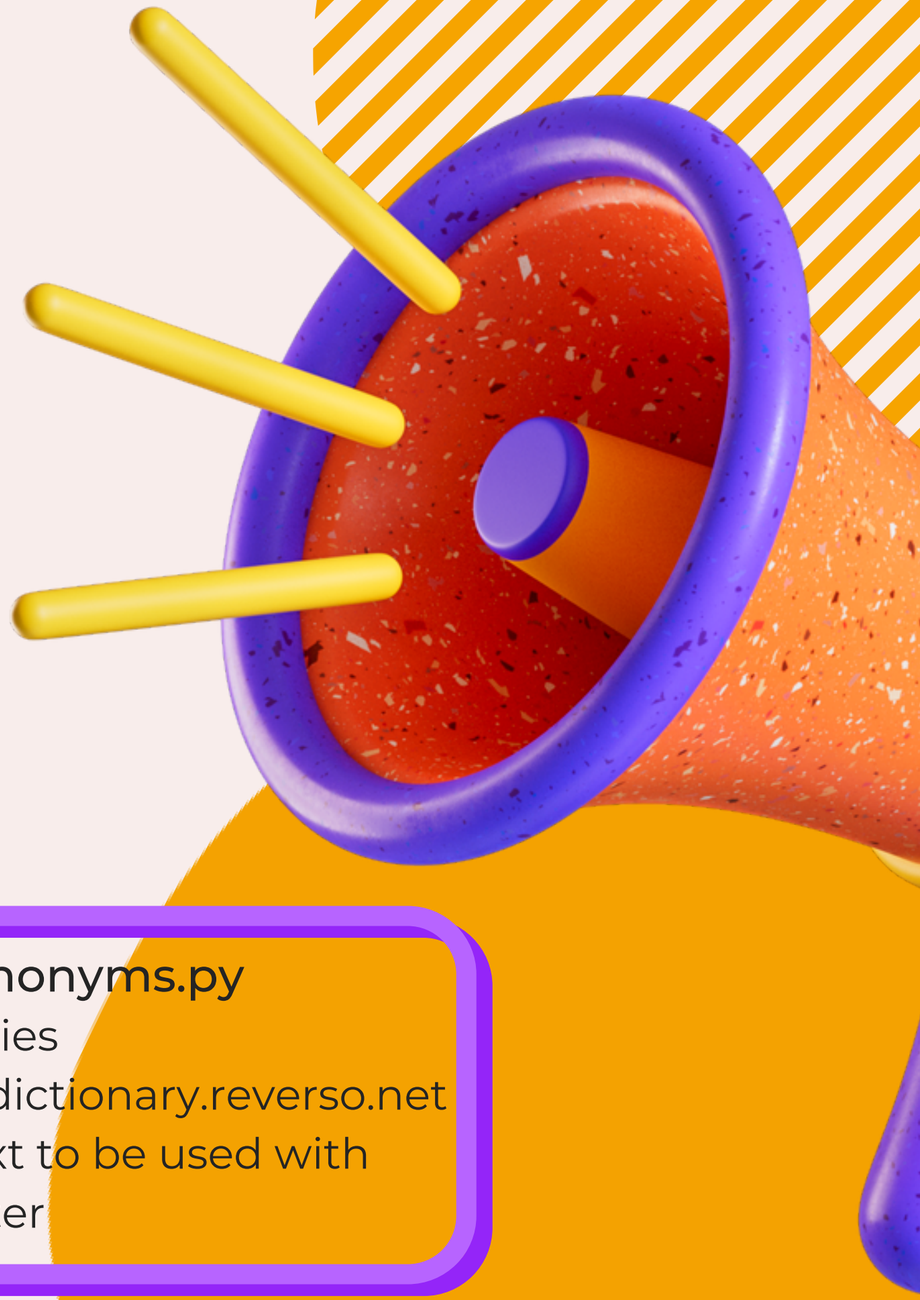
SIMILARITY

- Similarity functions compute documents' scores based on different statistics.
- **MultiSimilarity** combines evidence from multiple similarity functions.

System	MAP
BM25Similarity	0.1424
DFRSimilarity	0.1423
AxiomaticF2LOG	0.1358
AxiomaticF2EXP	0.1346
LMJelinekMercerSimilarity	0.1255
LMDirichletSimilarity	0.1204
ClassicSimilarity	0.0740
IndriDirichletSimilarity	0.0137
BooleanSimilarity	0.0121

Values refer to an initial system that performed the search on the English corpus.

QUERY EXPANSION



- Expands queries using synonyms
- Sometimes combined with reranking
- Query Drift
- Contextualized synonyms (overfitting)

search_synonyms.py

- parses french queries
- makes request to dictionary.reverso.net
- writes synonyms.txt to be used with SynonymGraphFilter

System	Filters	NDCG	TIME
BM25FRENCHBOOSTURL	ElisionFilter, LowerCaseFilter, StopFilter, ASCIIFoldingFilter, FrenchLightStemFilter	0.3815	MEDIUM
BM25FRENCHBASE	same as BM25FRENCHBOOSTURL	0.3812	FAST
BM25FRENCHRERANK100	same as BM25FRENCHBOOSTURL	0.3657	MEDIUM
BM25FRENCHDOCEXPANSION	ElisionFilter, LowerCaseFilter, StopFilter, SynonymGraphFilter, FlattenGraphFilter, ASCIIFoldingFilter, FrenchLightStemFilter, RemoveDuplicatesTokenFilter	0.3650	MEDIUM
BM25FRENCHSPAM	same as BM25FRENCHBOOSTURL	0.3623	SLOW
BM25FRENCHQUERYEXPANSION	ElisionFilter, LowerCaseFilter, StopFilter, SynonymGraphFilter, ASCIIFoldingFilter, FrenchLightStemFilter	0.3567	FAST
BM25TRANSLATEDQUERIES	LowerCaseFilter, StopFilter, KStemFilter	0.3037	MEDIUM

WHAT WE'VE ACHIEVED

System	NDCG WT	NDCG ST	NDCG LT	MAP	Recall @1000
BM25FRENCHBOOSTURL	0.3859	0.3866	0.3495	0.2152	0.8421
BM25FRENCHBASE	0.3843	0.3924	0.3916	0.2146	0.8451
BM25FRENCHRERANK100	0.3755	0.3756	0.3758	0.1960	0.8437
BM25FRENCHSPAM	0.3605	0.3680	0.3643	0.2067	0.7648
BM25TRANSLATEDQUERIES	0.3072	0.3051	0.3189	0.1523	0.7437

MAIN PROBLEMS WE HAVE FACED

Time sustainability

Advanced algorithms could not be implemented (e.g. RAKE, NLP)

Translation difficulties

Translation induced noise and its interference with IR

Ground truth quality

Is the Oracle really always right?

Non-uniform translation example

Item ID	French	English
q0622311 doc062200210641	bourse de l emploi public "Sélectionnée par Emploi Public"	Public Employment Exchange "Selected by Public servant"

ENGLISH-BASED SYSTEMS

Non uniform translation example

Impact of different translators

Query translation error example

Query translation error examples

Query ID	French	English
q062213307	cuisson gigot agneau	leg leg
q062228	aeroport bordeaux	airport

The translation of the queries is performed in the searcher, after parsing and before tokenization.
Developed tool: Google App Script platform based, deployed as a web application. It is used as a **REST resource.**

CONCLUSIONS

Understanding of possible future evolutions of the system

Main achievements:

0.382

nDCG and *recall* good results *(BM25FRENCHBOOSTURL)*

9

Multiple techniques tested - no overfitting on the training data

1

Development of a translation tool to improve effectiveness

1

Development of a Python algorithm to target SPAM

4

Ideas for future development and understanding of possible evolutions of the system

FUTURE WORK

Improve translation

Execute the documents BODY field translation in a computationally acceptable runtime

Systems combination

Perform multilingual search

Learn To Rank (LTR)

Implementation of LTR techniques

ML techniques implementation

e.g. threshold/ weights optimisation or SPAM detection improvement:

doc. length, word freq. distribution, variance, sentence, language

THANK YOU!

STRENGTHS

- Good results in terms of nDCGs and recall
- French- based systems development

WEAKNESSES

- SPAM recognition
- Translation errors and mismatch

OPPORTUNITIES

- SPAM detection improvement
- ML implementation
- LTR techniques implementation
- Systems combination

THREATS

- Computational time