Efficiently Scoring the Health-relatedness of Web Pages

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webis.de

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Motivation

About 70% of people with internet access use search engines as their primary source for medical information [Bondarenko et al., CIKM'21]

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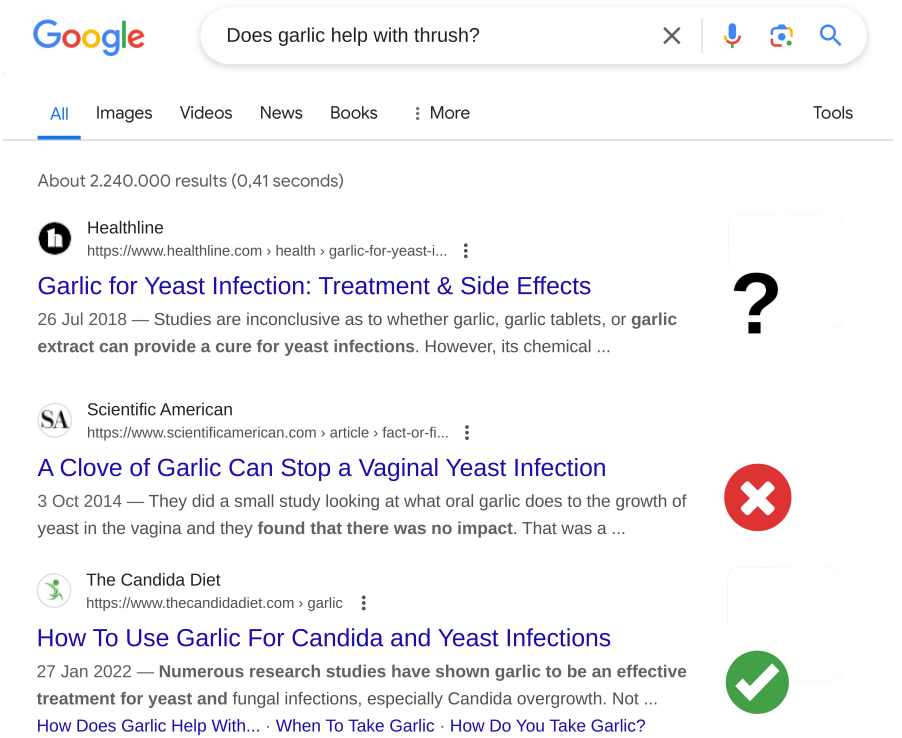

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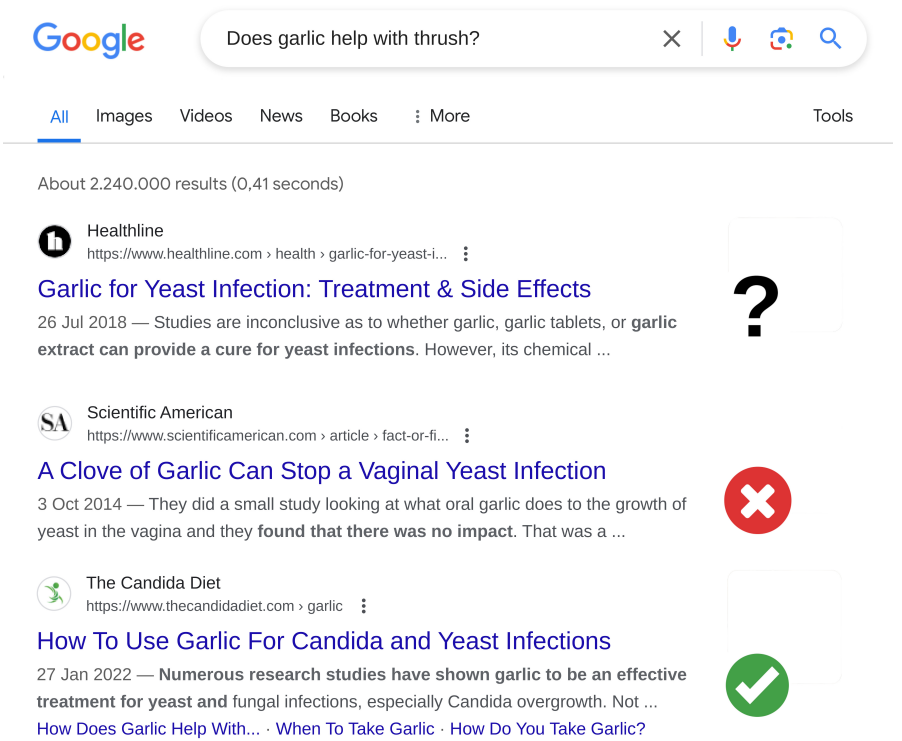

Health-related queries warrant special care

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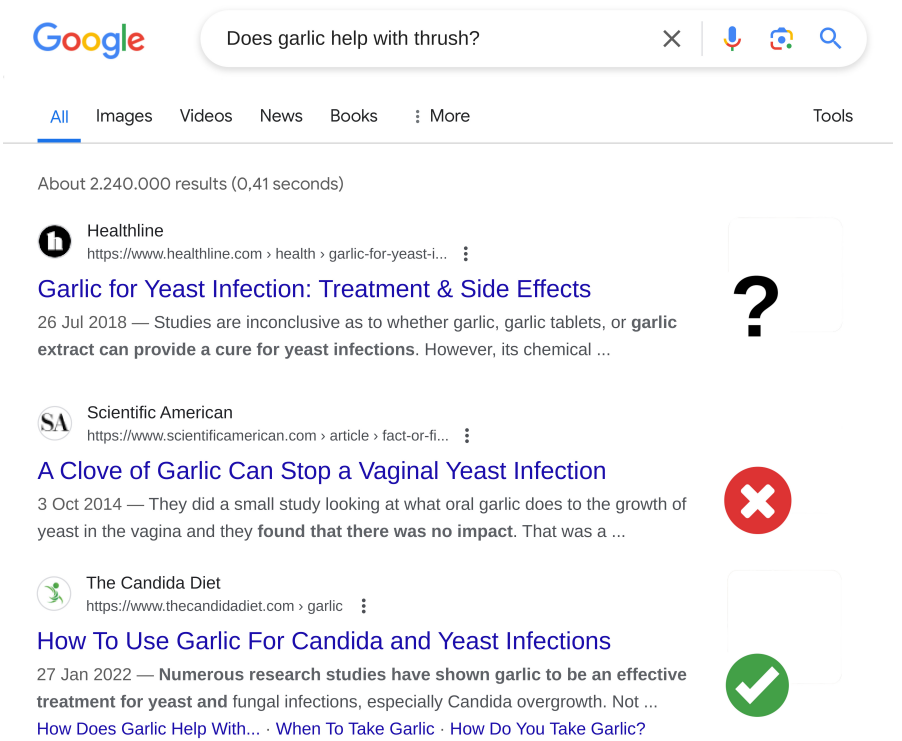

Health-related queries warrant special care

➜ Building a search engine for health information requires filtering health-related queries and documents

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Termhood Scores

In previous work, we developed an approach based on termhood scores to efficiently identify health-related phrases / terms [Schlatt et al., COLING'22]

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Termhood scores determine the degree to which a phrase is specific for a domain using the term frequencies of an in-domain and a contrastive corpus

Phrase	Health-related Corpus	Contrastive Corpus
actor	5,590	**539,180**
carcinoma	**987,164**	7,410
diagnosis	**1,851,514**	34,218
study	**10,630,098**	508,740
the	**200,926,211**	196,374,618
ward	47,099	**186,811**

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Discriminative Weight

We use the discriminative weight (DW) which combines [Wong et al., AusDM'07]

1. a corpus-oriented $tf \cdot idf$ measure
2. a domain-specificity measure

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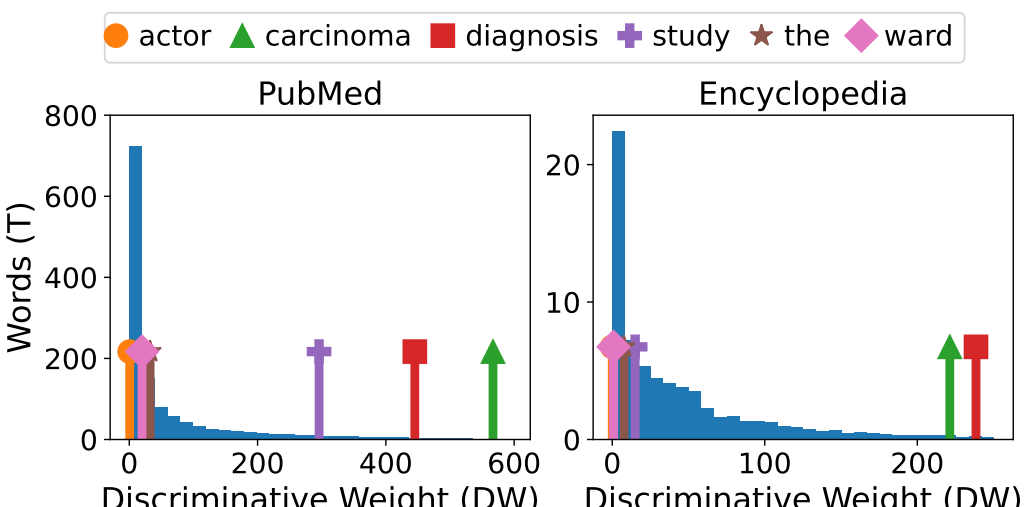

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Filtering Sentences

We applied the discriminative weight to classify if a sentence is health-related

Approach	P	R	F1	M
cTakes	0.57	0.46	0.51	0.42
ScispaCy	0.42	0.60	0.49	0.37
BERT	0.76	0.74	**0.75**	**0.70**
PubMedBERT	**0.87**	0.57	0.69	0.66
DW	0.71	**0.77**	0.74	0.68

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➜ DW more effective than entity linkers and (almost) as effective as BERT

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Approach	ms	Speedup
cTakes	212.12	0.2
ScispaCy	15.96	3.0
(PubMed) BERT	47.77	1.0
CW / TDS / DW	**1.02**	**46.8**

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➜ DW is substantially faster than entity linkers and BERT

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Pilot Study: Filtering Queries

We can also apply DW to classify if a query is health-related

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We applied our software submission to the TREC Web Tracks from 2009–2012

[Clarke et al., TREC'09–'12]

Text	Rank	DW
sore throat	1	411.7
forearm pain	2	354.0
joints	3	331.5
...		
lower heart rate	15	168.4
ct jobs	16	167.2
...		
angular cheilitis	33	76.90
getting organized	34	74.77
...		

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nDCG@10 for health-related vs non-health-related queries

Model	HQ	OQ
Dirichlet	0.27	0.25
BM25	0.24	0.19
MonoT5 3b	0.18	0.20
Splade	0.17	0.19

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Pilot Study: Filtering Documents

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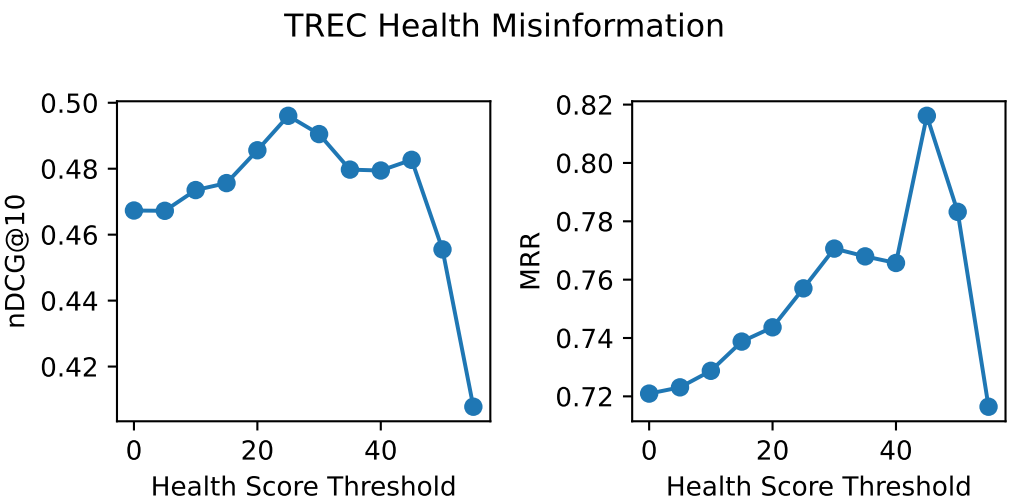
[Abualsaud et al., TREC'19]



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Conclusion

We presented a simple, efficient, effective approach for determining the health-relatedness of queries and documents

- We exemplify that filtering and handling health-related queries may be necessary to accurately retrieve health information
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Thank you!