

Health Card Retrieval for Consumer Health Search

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1. Why Health Cards?

- People **struggle to understand** health search results and fail to make correct decisions [1, 2].
- Health cards used to present **coherent, easy to understand, and trustworthy** health information.
- Presenting **health cards** significantly **increases the correct self-diagnosis** [3].

2. Research Question

How effective are current **retrieval models** in **ranking health cards** based on their relevance to a person's health query?



3. Health Card Collection Creation

Health Scenarios

41 self-diagnostic health scenarios based on the paper by Semigran et al., 2015 [4].

Search Queries

- We invited Amazon Mechanical Turk workers to search to self-diagnose based on health scenarios.
- We paid \$0.2 (USD) with a bonus of \$0.5 for a correct diagnosis.
- We collected 584 unique query variations for the 41 health scenarios.

Health Card Statistics and Features

- We crawled Diseases and Conditions section from Mayo Clinic [5].
- We collected 1,142 health cards which is comparable to Bing's health cards: 1,330 health cards.
- Each health card contains: name, aliases, overview, symptoms, and treatments.

Topic Id: 10, Diagnosis: Meningitis
Original Vignette: An 18-year-old male student presents with severe headache and fever that he has had for 3 days. Examination reveals fever, photophobia, and neck stiffness.
Modified Scenario: Your 18-year-old nephew is experiencing a very bad headache and fever over the last 3 days. He also complains of light sensitivity and neck stiffness.

Search Queries for Topic Id: 10

migraine	headache fever light sensitive stiff neck
migraines	light sensitivity neck stiffness headache
migraine symptoms fever	light sensitivity neck stiffness is it the flu
bad headache with fever cause	light sensitivity, headache, stiff neck, fever
headache, fever, neck stiffness	headache fever light sensitivity neck stiffness
headache and fever self treatment	headache fever light sensitivity neck stiffness feber
how often do migraines cause	headache fever light sensitivity neck stiffness
fevers	fever
headache and fever, light sensitivity	bad headache and fever light sensitivity and neck stiffness

4. Evaluating Health Card Retrieval Methods

- Evaluated methods:
 - *BM25F
 - *LM
 - *FSDM
 - *LeToR
- One correct health card for each topic.
- Measures:
 - *Success at rank 1 (S@1)
 - *Success at rank 4 (S@4)
 - *Reciprocal Rank (RR)

5. Results

Topic based Evaluation

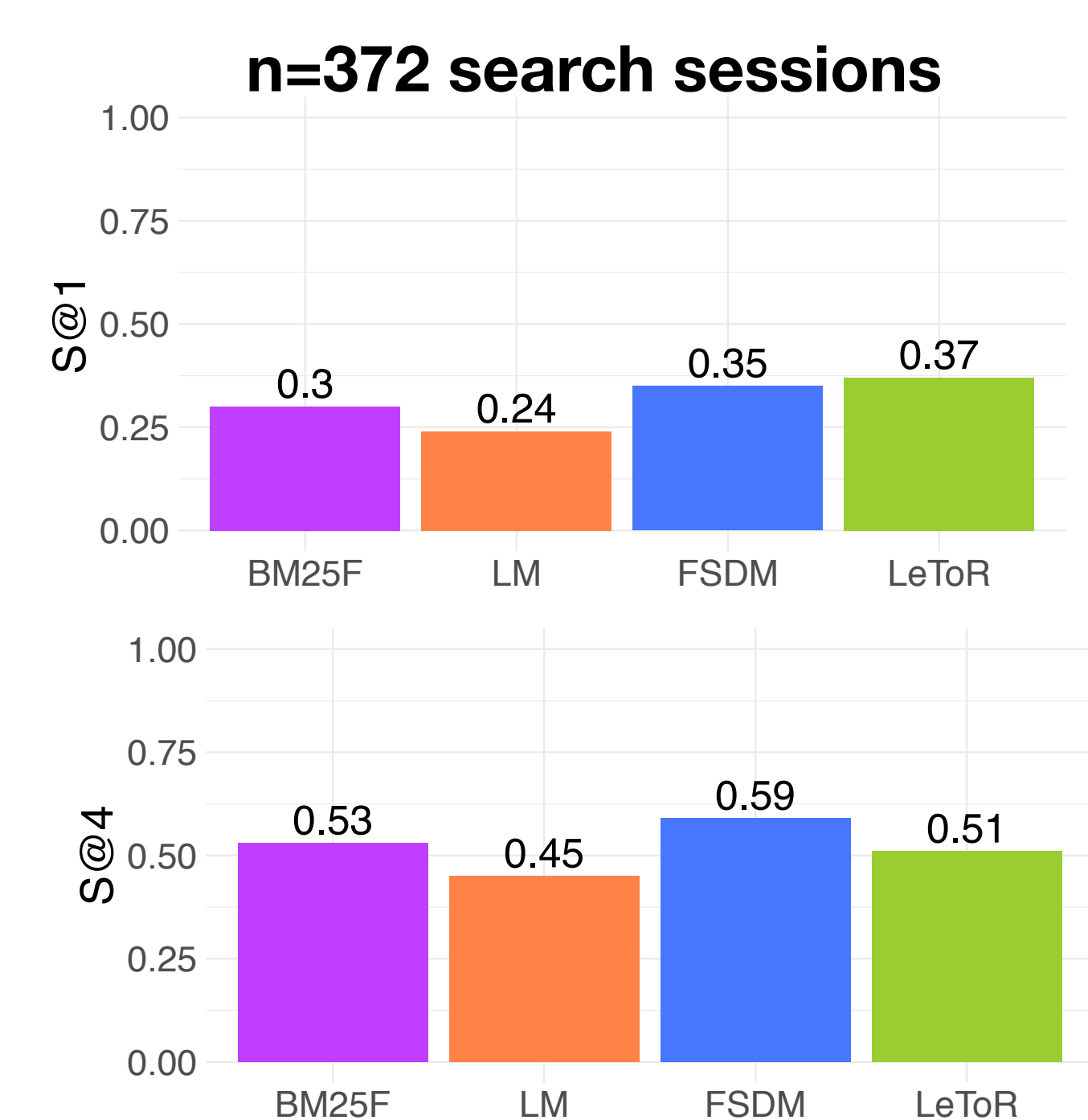
- Each query is judged based on its relevance to the topic.
- Includes all 584 queries.

Query Based Evaluation

- "Navigational" query is often a part of diagnosis strategy that targets a specific health condition.
- E.g., query "migraine" to diagnose "meningitis"
- Each navigational query is judged based on its relevance to the query.

Session Based Evaluation

- A search session has a task to complete.
- It includes one or more search queries.
- Success is measured across all queries in a search session.



A user search session targeting "canker sore" as the correct diagnosis.

	q1 mouth ulceration	q2 mouth herpes	q3 mouth herpes ulcer	q4 canker sore
S@1	0.0000	0.0000	0.0000	1.0000
S@4	0.0000	0.0000	1.0000	1.0000
RR	0.1667	0.1429	0.5000	1.0000

6. Contributions

- We investigated methods to **retrieve health cards based on observation of symptoms for self-diagnosis**.
- We introduced **LeToR features specific to health cards** that statistically increase the effectiveness LeToR.
- We **assembled and released the first test collection of health cards** containing information for 1,142 health conditions, and 584 query variations for 41 self-diagnosis search tasks.

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