Using Semantic and Context Features for Answer Summary Extraction

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Why Should We Care About Answer Summaries?

Generating summaries that address the question will satisfy user needs more quickly
- May lead to "good abandonment"
- Ideal for web search via mobile devices or other low-bandwidth channels

Query: *what are some of the possible complications and potential dangers of gastric bypass surgery?*

Err… where's the answer?
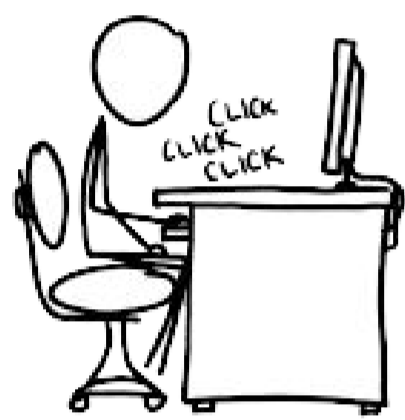
Bariatric surgery Risks - Mayo Clinic
www.mayoclinic.org/tests-procedures/**bariatric-surgery**/basics/**risks**/prc-20019138
It's important to understand **risks** and results of **gastric bypass** and other types … **gastric bypass** and other **weight-loss surgeries** pose **potential** health **risks**, both … Longer term **risks** and **complications** of **weight-loss surgery** vary depending on ...

Learning-to-Rank Approach

Metzler-Kanungo Features
- Exact Match
- Term Overlap
- Synonym Overlap
- Language Model Score
- Sentence Length
- Sentence Location

Semantic Features
- ESA (semantic relatedness)
- Word2Vec (word embedding)
- TAGME (entity-linking)

Context Features ("Meta Features")
- X_{Before}
- X_{After}

Experiments

Two difficulties are addressed with this approach
1. Answers and questions might be worded differently
2. Answers might appear in nearby sentences

Data
- WebAP dataset: 82 description queries, graded relevance
- The study focused on *excellent* and *perfect* passages

Baseline
- Convolutional Neural Network (Severyn and Moschitti, 2015)
- Metzler-Kanungo Features

Evaluation
- ROUGE scores of the top-3 retrieved sentences
- Retrieval effectiveness metrics such as NDCG@3 and P@3
- Paired t-test for significance testing

Results on Summary Quality and Sentence-Level Retrieval Effectiveness

Method		ROUGE-1	ROUGE-2	ROUGE-SU4	NDCG@3	P@3
CNN (Severyn and Moschitti, 2015)		0.550	0.318	0.343	0.196	0.164
MK	MART	0.599	0.365	0.389	0.229	0.183
MK+Sem		0.619	0.396†	0.417†	0.260†	0.212‡
MK+Sem+Context		0.632‡	0.427‡**	0.447‡**	0.300‡**	0.246‡**
MK	LambdaMART	0.586	0.354	0.377	0.231	0.179
MK+Sem		0.619‡	0.426‡	0.446‡	0.280‡	0.226‡
MK+Sem+Context		**0.661‡****	**0.466‡****	**0.484‡****	**0.340‡****	**0.268‡****

†/‡: $p < 0.05/0.01$ wrt MK   */**: $p < 0.05/0.01$ wrt MK+Sem