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Snippet Generation for WikiSearch

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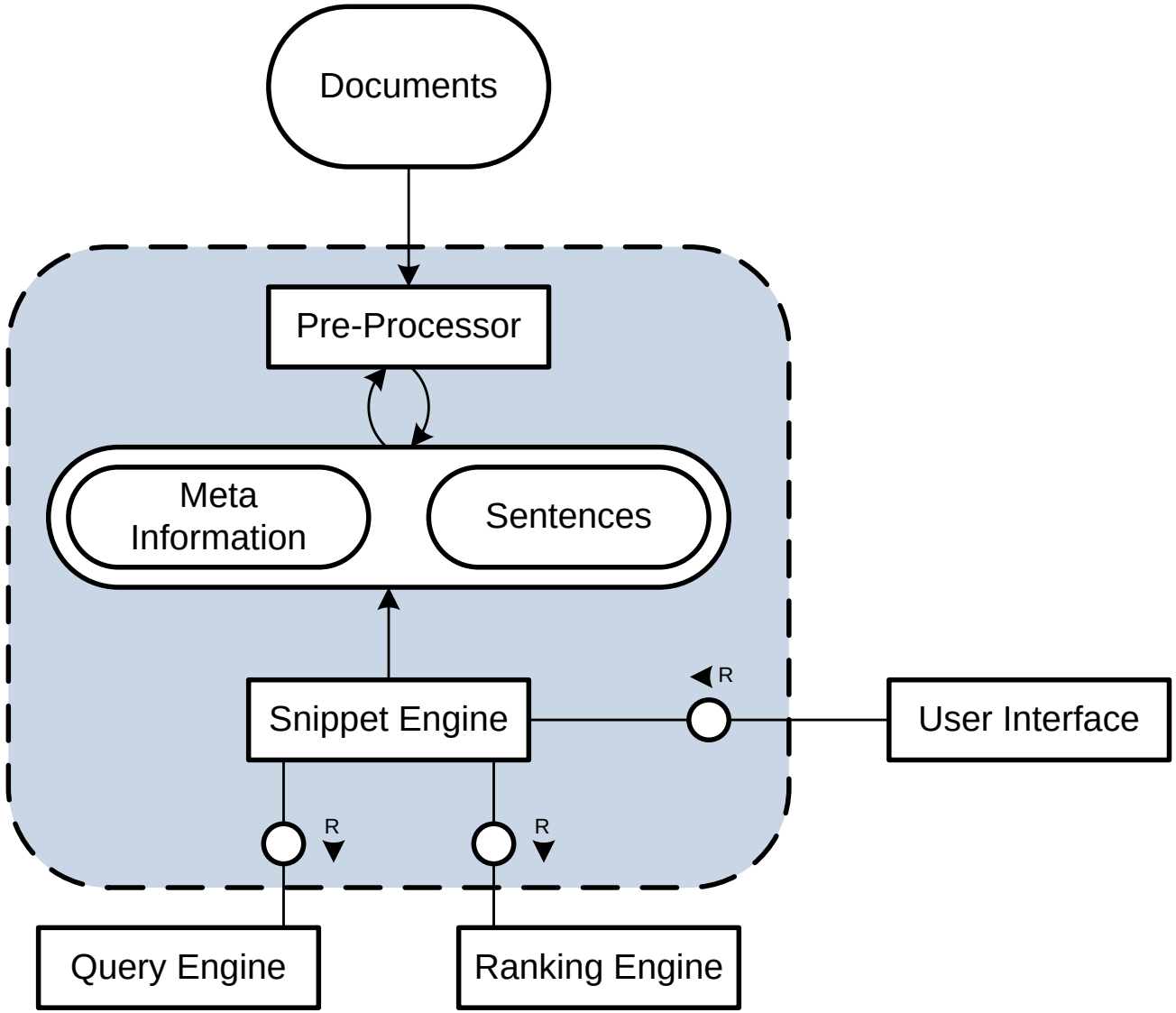
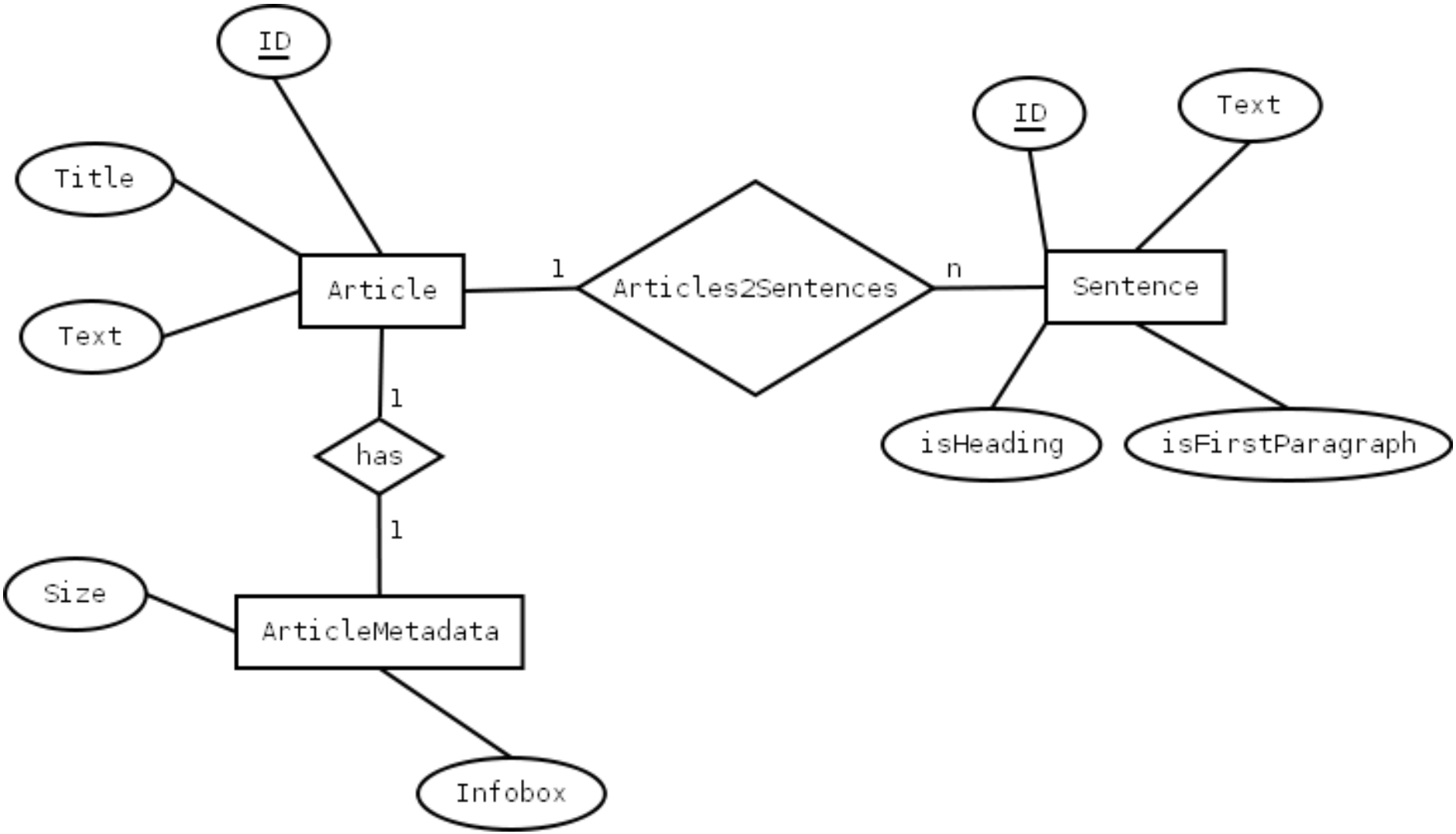
Architecture



Database Schema



Demo

Hoover, Alabama
The city is divided into two battalions. There are eight **engine** companies, three quints, three ALS rescue/ambulances, and two battalion chiefs [4.08]... All **engine** companies are staffed with a minimum of three, with at least two being firefighter/paramedics [4.0]... BE&K **Engineering** - 302 [3.88]...

Official Name:	Hoover, Alabama
Settlement Type:	City

kheed Vega, a single **engine** plane that carried four passengers
nental system, as well as competitors flights, to assure tight quality
adopted to Continentals network [4.08]... Continental Airlines, Inc.

efighters. The CFD utilizes three **Engines,** a Ladder truck, a Heavy
h in Bergen County, New Jersey, United States [2.5]... As of the
tion was 5,917 [2.0]...

bathyscaphe Trieste, oceanographic ship Mizar and other ships,
r, some 8,400 feet (2560 m) below the surface, in six
he sail, sonar dome, bow section, **engineering** spaces section,
[4.08]... In later life, McCoole was sure he would have delayed

Features

- WikiMedia markup parser
- Sentence normalization separated from query processing
- Flexible ranking algorithm [Turpin et al., 2007]
- Account for WikiMedia markup specific features
- 42 unit tests
- LOC: 575 (parser) + 392 (front-end) = 967
  (`cat *java | grep \; | grep -v  // | wc -l`)

Lessons learned

- WikiMedia markup is not *that* simple
- Best to process it in multiple passes
- Sentence normalization should be handled earlier in search engine architecture
- Unicode is fun

Ranking Algorithm


```
1   if (isHeading)
2     rank+= HEADING_WEIGHT;
3   else
4     rank+= (1.0F / sentence.getInParagraphPosition());
5
6   if (isInFirstParagraph)
7     rank+= FIRST_PARAGRAPH_WEIGHT;
8
9   rank+= queryTermsCount * REPEATED_QT_WEIGHT;
10  rank+= distinctQueryTermsCount * DISTINCT_QT_WEIGHT;
11  rank+= highestConsecutiveCount * CONSECUTIVE_QT_WEIGHT;
```

Ranking Example

- Sentence: "Sun Microsystems has released the Niagara and Niagara 2 chips, both of which feature an eight-core design."

```
1   static final float HEADING_WEIGHT = 0.5F;                    // added
2   static final float FIRST_PARAGRAPH_WEIGHT = 1.5F;            // higher than heading!
3   static final float REPEATED_QUERY_TERMS_WEIGHT = 1.25F;      // multiplied
4   static final float DISTINCT_QUERY_TERMS_WEIGHT = 1.5F;       // multiplied
5   static final float CONSECUTIVE_QUERY_TERMS_WEIGHT = 1.0F; // multiplied
6   static final float RANK_THRESHOLD = 1.5F + (1.0F * DISTINCT_QUERY_TERMS_WEIGHT);
7   static final int SENTENCES_COUNT_THRESHOLD = 3;
8
9   float rank = 0.0F;
10  if (isHeading)
11      rank+= HEADING_WEIGHT;
12  else
13      rank += (1.0F / sentence.getInParagraphPosition());
14  if (isInFirstParagraph)
15      rank+= FIRST_PARAGRAPH_WEIGHT;
16  // rank = 1
17  rank += matchedQueryTermsCount * REPEATED_QUERY_TERMS_WEIGHT;
18  // rank = 1 + 2*1.25 = 3.5
19  rank += matchedDistinctQueryTermsCount * DISTINCT_QUERY_TERMS_WEIGHT;
20  // rank = 3.5 + 2*1.5 = 6.5
21  rank += highestConsecutiveCount * CONSECUTIVE_QUERY_TERMS_WEIGHT;
22  // rank = 6.5 + 2*1 = 8.5
```

Parser Dispatch


```
1   while (!atEnd()) {
2     step();
3     if (parseHeading()) continue;
4     if (parseProcessingAction()) continue;
5     if (parseInfobox()) continue;
6     if (parseTemplate()) continue;
7     if (parseTag()) continue;
8     if (parseEscapedTag()) continue;
9     if (parseFileLink()) continue;
10    if (parseEmbeddedLink()) continue;
11    if (parseLink()) continue;
12    if (parseList()) continue;
13    if (parseDots()) continue;
14    if (parseParagraphEnd()) continue;
15    if (parseSentenceEnd(WikiPart.SENTENCE)) continue;
16    if (parseUnimportantChars()) continue;
17    if (parseSentenceChar()) continue;
18    throw new Error("Not recognized input");
19  }
```

References

Turpin, A., Tsegay, Y., Hawking, D., and Williams, H. (2007).
Fast generation of result snippets in web search.
In *Proceedings of the 30th annual international ACM SIGIR conference on Research and development in information retrieval*, pages 23–27.