Roadmap

- Rounding dimensions of QA
  - Evaluation, TREC

- QA systems: Alternate Approaches
  - ISI’s Webclopedia
  - LCC’s PowerAnswer-2 and Palantir
  - Insight’s Patterns

- Resources
Evaluation

- Candidate criteria:
  - Relevance
  - Correctness
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• Tension among criteria
Evaluation

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- **Consistency/repeatability:**
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- **Automation:**
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  - Required for machine learning tune/test
    - Short answer answer keys
    - Litkowski’s patterns
Evaluation

- Classical:
  - Return ranked list of answer candidates
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  - Idea: Correct answer higher in list => higher score
  - Measure: Mean Reciprocal Rank (MRR)
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- Measure: Mean Reciprocal Rank (MRR)
  - For each question,
    - Get reciprocal of rank of first correct answer
      - E.g. correct answer is 4 ➞ $\frac{1}{4}$
      - None correct ➞ 0
    - Average over all questions

$$MRR = \frac{1}{N} \sum_{i=1}^{N} \frac{1}{\text{rank}_i}$$
Dimensions of TREC QA

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  - Fixed collections
  - News, blogs
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- Answer types
  - Predominantly extractive, short answer in context
- Evaluation:
  - Official: human; proxy: patterns
- Presentation: One interactive track
Webclopedia

- Webclopedia system:
  - Information Sciences Institute (ISI), USC
  - Factoid QA: brief phrasal factual answers
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Webclopedia Improvements

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- QA pattern matching
- Classify QA types to improve answer type ID
- Use robust syntactic-semantic parser for analysis
- Combine word-, syntactic info for answer selection
Webclopedia Architecture

- Query parsing
- Query formulation
- IR
- Segmentation
- Segment ranking
- Segment parsing
- Answering pinpointing & ranking
Webclopedia QA Typology

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    - Qtarget: semantic type of answer
### Webclopedia QA Typology

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<thead>
<tr>
<th>VERACITY</th>
<th>YES:NO</th>
</tr>
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<tbody>
<tr>
<td>TRUE:FALSE</td>
<td></td>
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<table>
<thead>
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<th>AGENT</th>
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<th>LAST-NAME</th>
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<td></td>
<td></td>
<td>COMPANY-NAME</td>
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<td>ORGANIZATION</td>
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<td>GROUP-OF-PEOPLE</td>
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<td>OCCUPATION-PERSON</td>
</tr>
<tr>
<td></td>
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    - Extracted based on 276 hand-written rules
      - 10%: no target
Answer Matching

- Matches:
  - QA patterns in parse tree
  - Qtarget and Qwords in parse tree
  - Words in window
Enhancing
Word-based Match

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- Parse information
  - Link discontinuous answer information
QTTarget: External Knowledge

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    - Q: *What is the Milky Way?*
    - Candidate 2: the galaxy that contains the Earth
    - Wordnet: Milky Way—the galaxy containing the solar system
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  - Provide implicit information
    - Q1: What is the capital of the United States?
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Results

- TREC rank 2 (tied):
  - Contribution: Qtarget, Word window, QA patterns
  - QA patterns too specific (only 4% of answers)
  - Qtarget classification biggest impact