Query Processing: Query Formulation

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Roadmap

- Motivation:
  - Retrieval gaps
- Query Formulation:
  - Question Series
  - Query reformulation:
    - AskMSR patterns
    - MULDER parse-based formulation
  - Classic query expansion
    - Semantic resources
    - Pseudo-relevance feedback

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    - Q: When did the first American president take office?
    - A: George Washington was inaugurated in….

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    - Query expansion
  - Differences in structure

Query Formulation

- Convert question suitable form for IR
- Strategy depends on document collection
  - Web (or similar large collection):
    - ‘stop structure’ removal:
      - Delete function words, q-words, even low content verbs
  - Corporate sites (or similar smaller collection):
    - Query expansion
      - Can’t count on document diversity to recover word variation
      - Add morphological variants, WordNet as thesaurus
      - Reformulate as declarative: rule-based
        - Where is X located -> X is located in

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Target 27 - *Jennifer Capriati*	
Q27.2	Who is her coach?
Q27.3	Where does she live?

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- Least shallow approach:
  - Heuristic reference resolution

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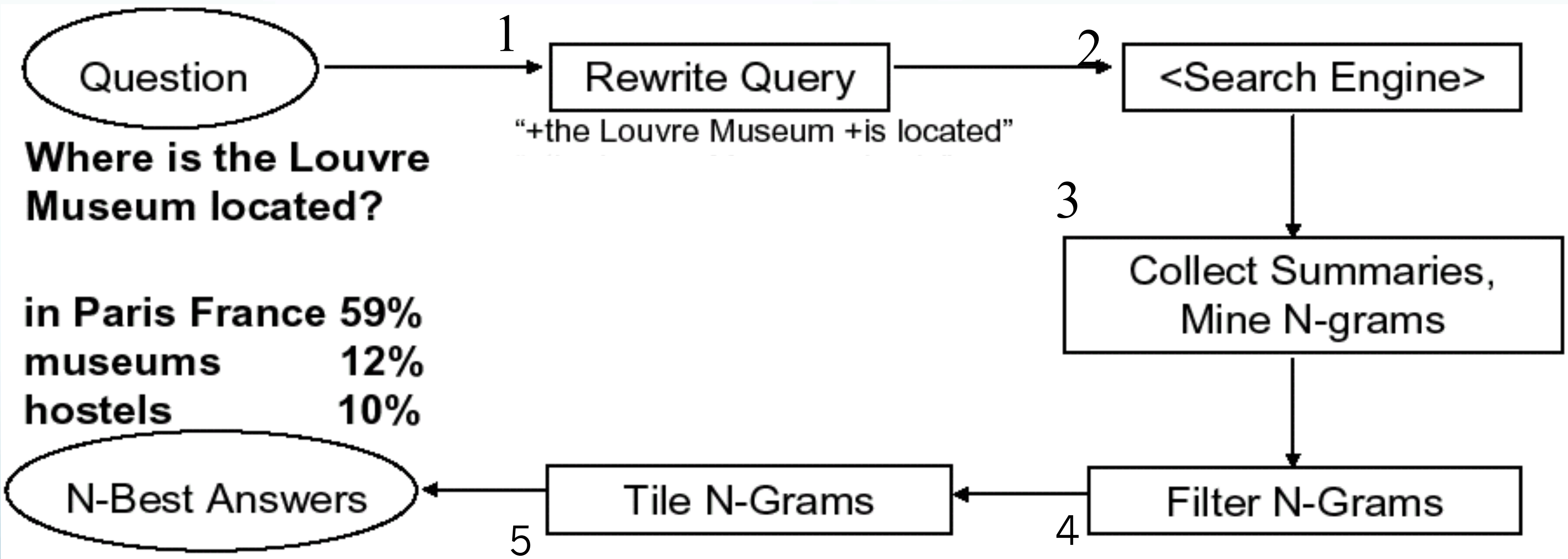
  - Most teams concatenate

AskMSR

- Shallow Processing for QA
  - (Dumais et al 2002, Lin2007)



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  - Probably 5

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- Create type-specific answer type (Person, Date, Loc)

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      - Where is A? -> A is located in ?x (specific)
  - Inexact reformulation: bag-of-words

Query Reformulation

- Examples

What year did Alaska become a state?

[baseline]	What year did Alaska become a state
[inexact]	Alaska became a state
[exact]	Alaska became a state ?x

Who was the first person to run the mile in less than four minutes?

[baseline]	Who was the first person to run the mile in less than four minutes?
[inexact]	the first person to run the mile in less than four minutes
[exact]	the first person to run the mile in less than four minutes was ?x
[exact]	?x was the first person to run the mile in less than four minutes

Deeper Processing for Query Formulation

- MULDER (Kwok, Etzioni, & Weld)
- Converts question to multiple search queries
  - Forms which match target
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- Employs full parsing augmented with morphology

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- Learn question paraphrases (MSRA)
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- Question reformulation as machine translation
  - Given question logs, click-through snippets
    - Train machine learning model to transform Q -> A

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  - With long queries & long documents, no/bad effect
- Some recent positive results on short queries
    - E.g. Fang 2008
  - Contrasts different WordNet, Thesaurus similarity
  - Add semantically similar terms to query
    - Additional weight factor based on similarity score

Similarity Measures

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- Term similarity score from Lin's thesaurus

Results

- Definition similarity yields significant improvements
  - Allows matching across POS
  - More fine-grained weighting that binary relations

Deliverable #2 Discussion

- More training data available
- Test data released
- Requirements

- Deliverable Reports