Forst: Question Answering System for Term and Essay Questions at NTCIR-13 QA Lab-3 Task

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Motivation

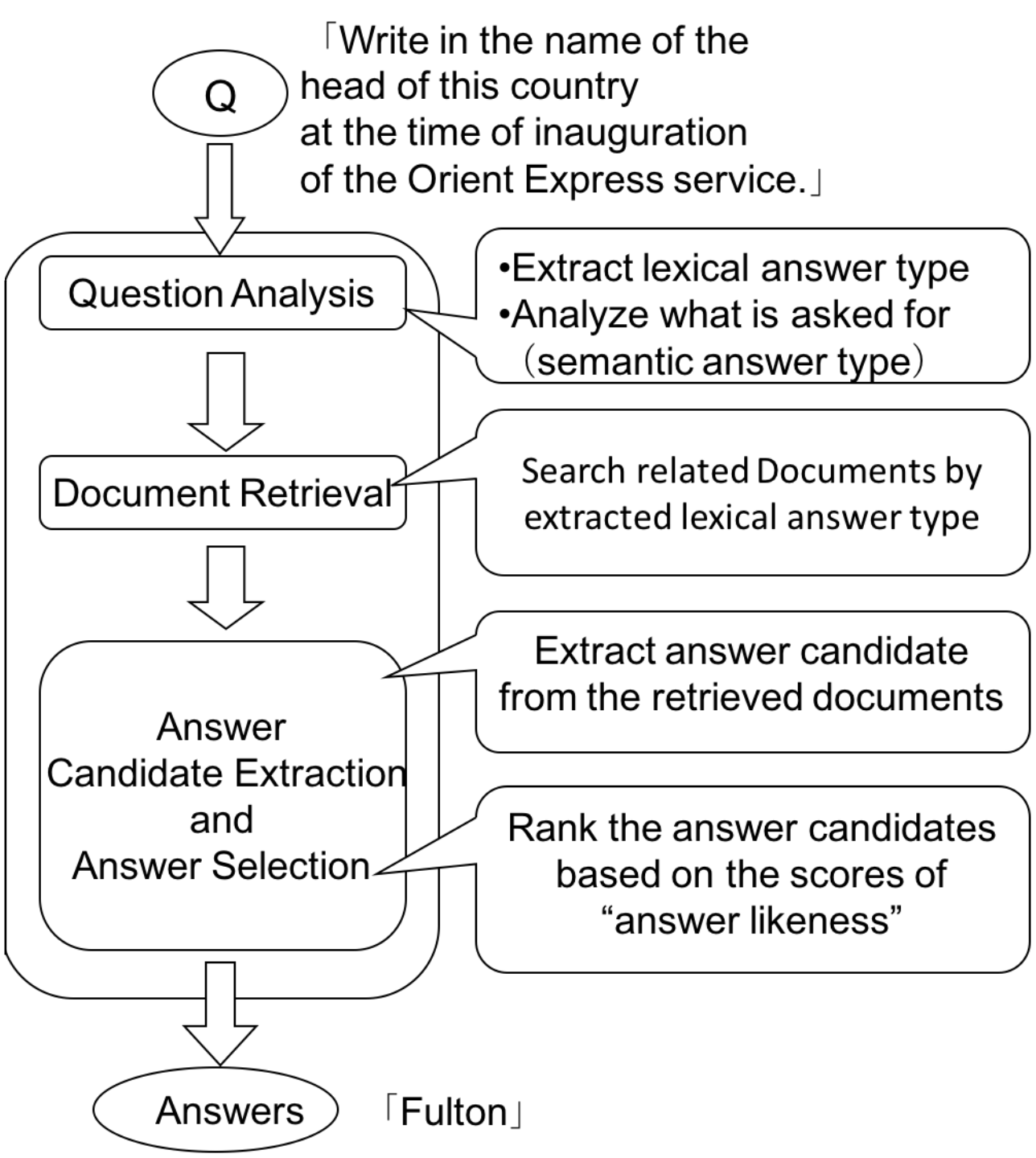
- QA is widely regarded as an advancement in IR.
- However, QA systems are not as popular as search engines in the real world.
- In order to apply QA systems to real-world problems
- We tackled the **term question task and the essay question task including the evaluation-method subtask in Japanese**
- Our systems for the term question task and the essay question end-to-end subtask are successors of our systems at the QA Lab-2

Knowledge Sources

- 4 textbooks (Given in the task)
- World history event ontology (Given in the task)
- Glossary (6,081 words)
- Term Q & A collection (4,324 pairs)
- Essay Q & A collection (about 1,200 pairs from 6 books)
- Japanese thesaurus (about 300,000 entry words)
- English translation of the 4 textbooks by Google Translate
- English translation of the glossary by Google Translate

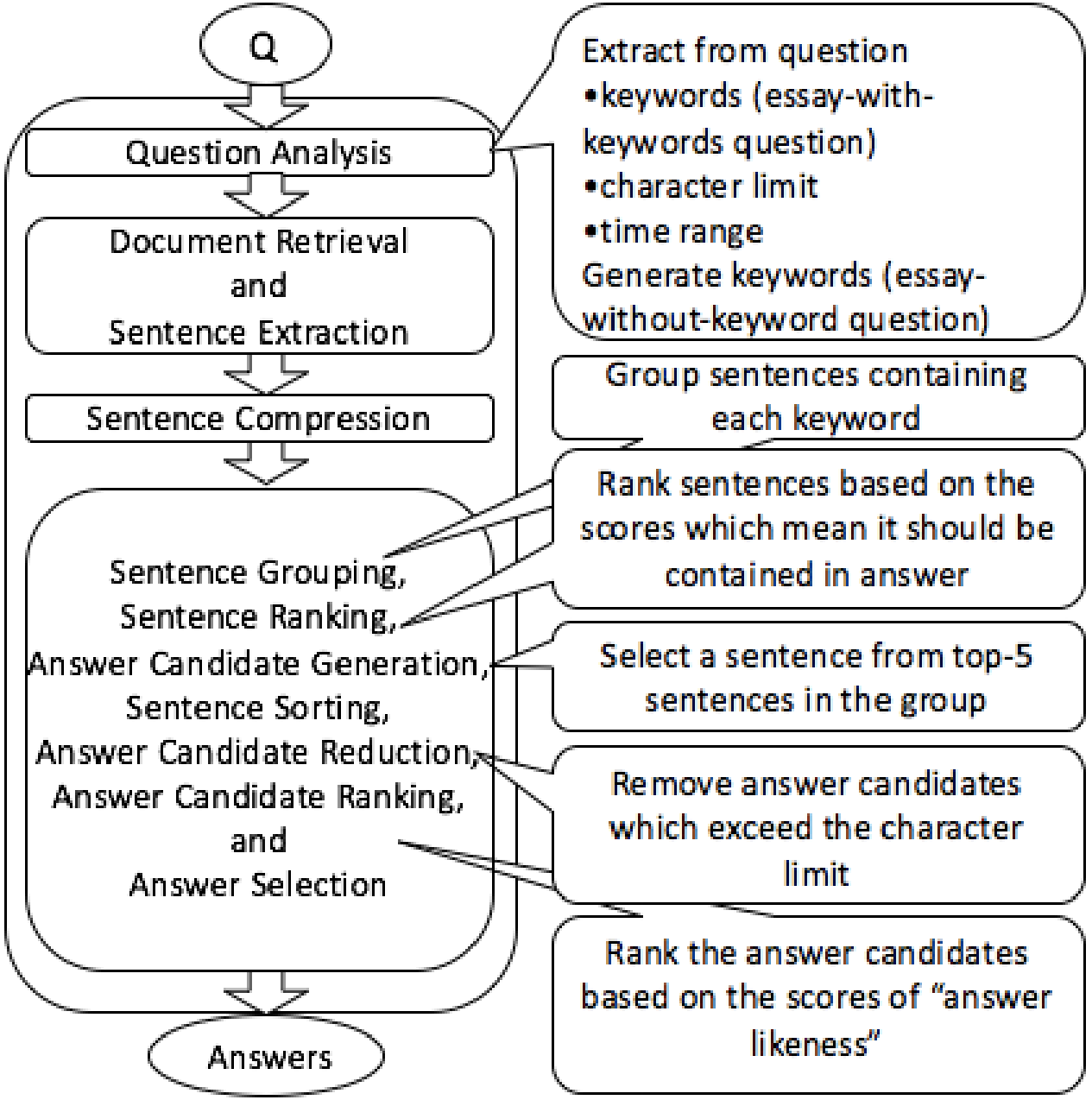
Term type answering (JA)

- The same pipeline as QA Lab-2's Forst system
- Updates since QA Lab-2:
  - Using **keyword importance**
    - The later keywords appear in a question are more emphasized.
  - **Extending dictionary** for NE of world history
  - **Adding decision rules** for question types
  - Using **majority decision score** for answer selection



Essay type answering (JA)

- We developed 3 types of end-to-end system.
  1. QA Lab-2's Forst system + MMR
     - The (minor) update is to add sentences from top in the MMR ranking when the answer is shorter than the length limitation
     - Using Okapi BM25 to extract sentences if there were no keywords; short essay questions.
     - (Released to the public) github.com/ktr-skmt/FelisCatusZero-multilingual



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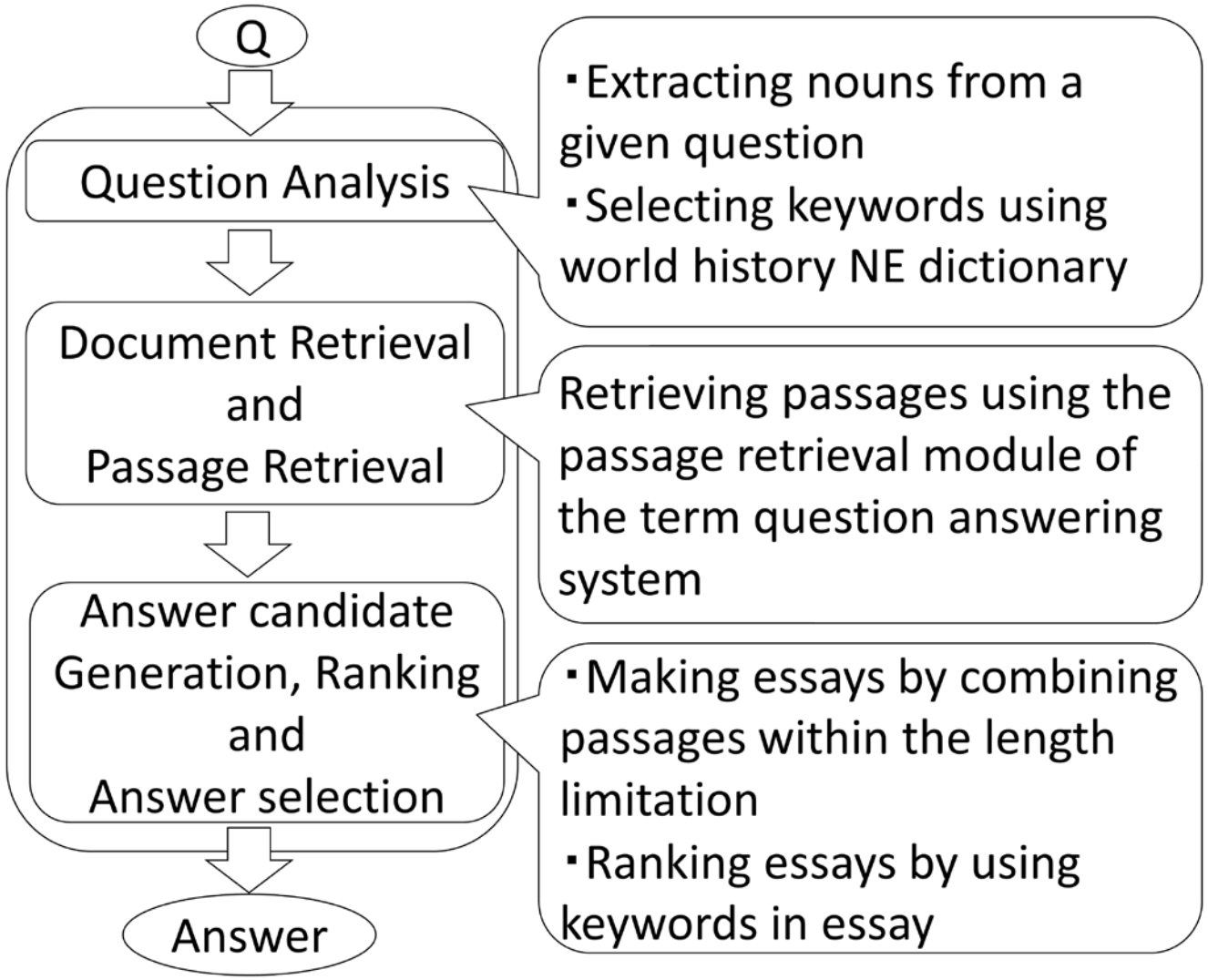

Essay type answering (JA)

- We developed 3 types of end-to-end system.
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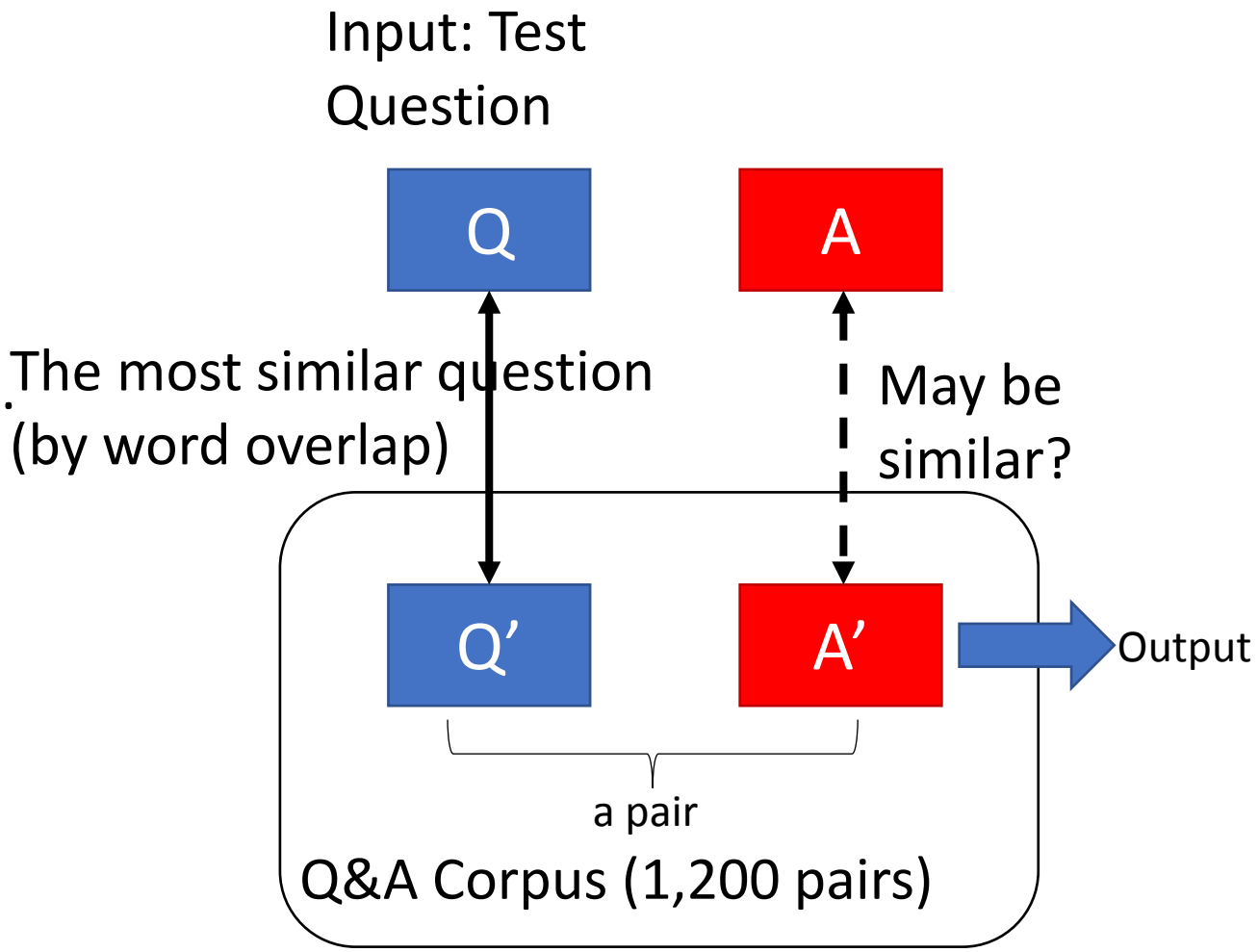
  2. Use of `**implicit keywords**' that are question focuses but not stated positively
  3. Example based. Use of Q&A corpus (**including test questions**)



Essay evaluation method (JA)

- We developed two types of evaluation method systems
  1. Based on world history **terms**
     1. Simply counts the number of terms in essay
  2. Based on gold standard **nuggets**
     1. Segments an essay into sentences by punctuation
     2. Counts the number of nuggets that are matched with any one of sentences
        - If more than one term in a nugget are included in a sentence, the nugget is matched with the sentence.

Evaluation Results – Term Question Task (JA)

	Correct rate
Phase1	0.397
Phase2	0.273

Evaluation Results – Essay question's end-to-end task

	priority	Human expert (complex essay only)	ROUGE-1
Phase1	1	0.011	0.0523
	2		**0.0698**
	3		(0.0887)
Phase2	1	0.0339	0.0385
	2		**0.0680**

Evaluation Results -
Essay question's evaluation method task

	priority	approach	Spearman's Rho	Kendall's Tau-b
Phase1	1	term	0.427	0.334
	2	nugget	**0.596**	**0.534**
Phase2	1	term	-0.071	-0.049
	2	nugget	**0.404**	**0.360**

Conclusion

- We participated in all phases of the term question task and the essay question task in Japanese
- Although the **updates since the QA Lab-2** did **not** bring the major **improvement**
- Using **`implicit keywords'** extracted from question texts makes the **results better**
- The evaluation results of the evaluation method based on gold standard nuggets are **moderate**