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Tamkang University
淡江大學

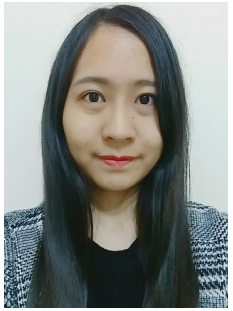
IMTKU Question Answering System for World History Exams at NTCIR-13 QALab-3

Department of Information Management
Tamkang University, Taiwan

Min-Yuh Day

Chao-Yu Chen

Wanchu Huang

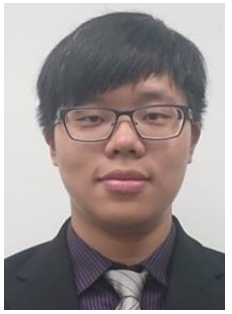


Shi-Ya Zheng

I-Hsuan Huang

Tz-Rung Chen

Min-Chun Kuo



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Yi-Jing Lin

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NTCIR-13 Conference, December 5-8, 2017, Tokyo, Japan

IMTKU Question Answering System for World History Exams at NTCIR-13 QALab-3

Tamkang University
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2011

Tamkang University

IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-9 RITE

Department of Information Management
Tamkang University, Taiwan

Min-Yuh Day **Chun Tu**

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NTCIR-9 Workshop, December 6-9, 2011, Tokyo, Japan

Tamkang University
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2013

Tamkang University

IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-10 RITE-2

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NTCIR-10 Conference, June 18-21, 2013, Tokyo, Japan

IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-11 RITE-VAL 2014

Tamkang University

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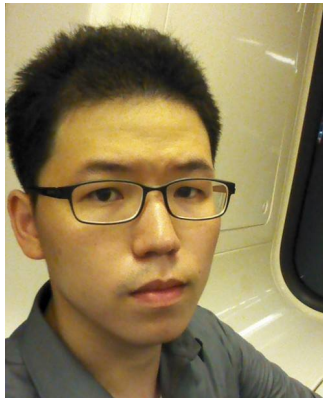
Min-Yuh Day

Ya-Jung Wang

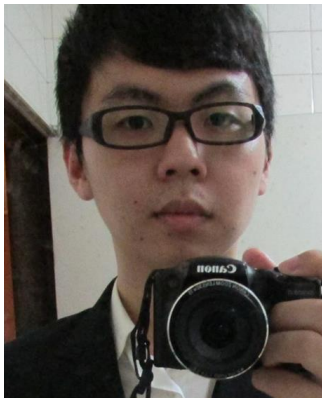
Che-Wei Hsu

En-Chun Tu



Huai-Wen Hsu

Yu-An Lin



Shang-Yu Wu

Yu-Hsuan Tai

Cheng-Chia Tsai

NTCIR-11 Conference, December 8-12, 2014, Tokyo, Japan

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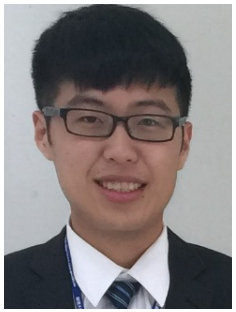
2016

IMTKU Question Answering System for World History Exams at NTCIR-12 QA Lab2

Department of Information Management
Tamkang University, Taiwan

Sagacity Technology

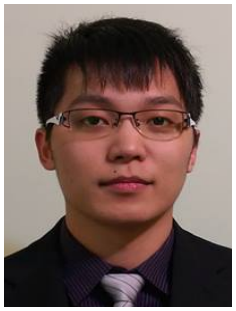
Min-Yuh Day


Cheng-Chia Tsai

Wei-Chun Chung

Hsiu-Yuan Chang

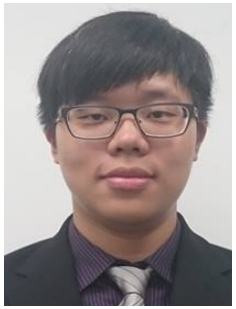
Tzu-Jui Sun


Yuan-Jie Tsai

Jin-Kun Lin

Cheng-Hung Lee

Yu-Ming Guo


Yue-Da Lin

Wei-Ming Chen

Yun-Da Tsai

Cheng-Jhih Han

Yi-Jing Lin

Yi-Heng Chiang

Ching-Yuan Chien

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NTCIR-12 Conference, June 7-10, 2016, Tokyo, Japan

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2017

Tamkang University
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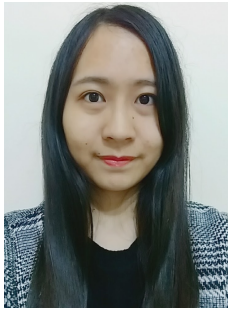

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NTCIR-13 Conference, December 5-8, 2017, Tokyo, Japan

Outline

- IMTKU Question Answering System Architecture
- IMTKU System Description
- Performance
- Discussions and Conclusions

Highlights

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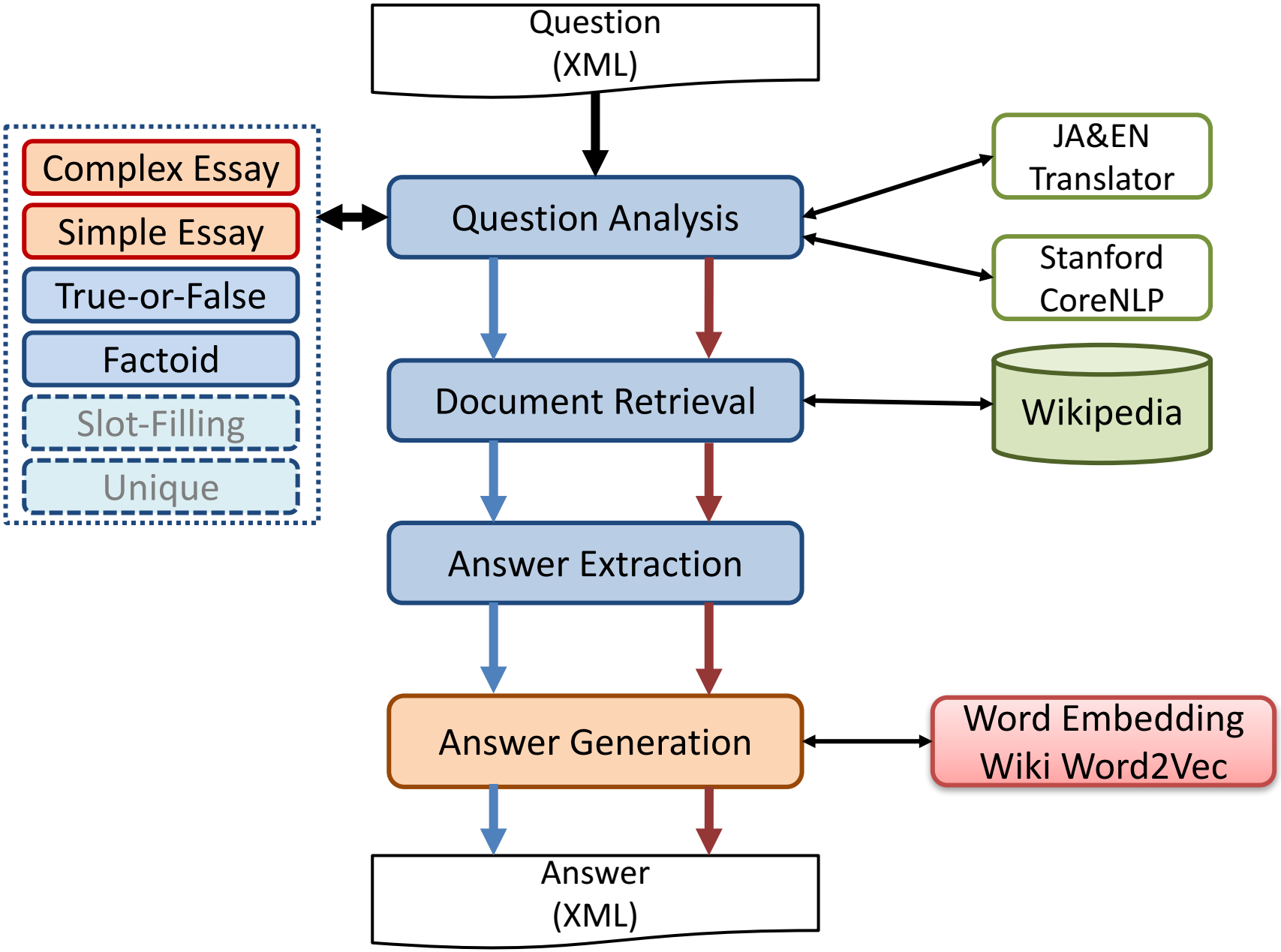
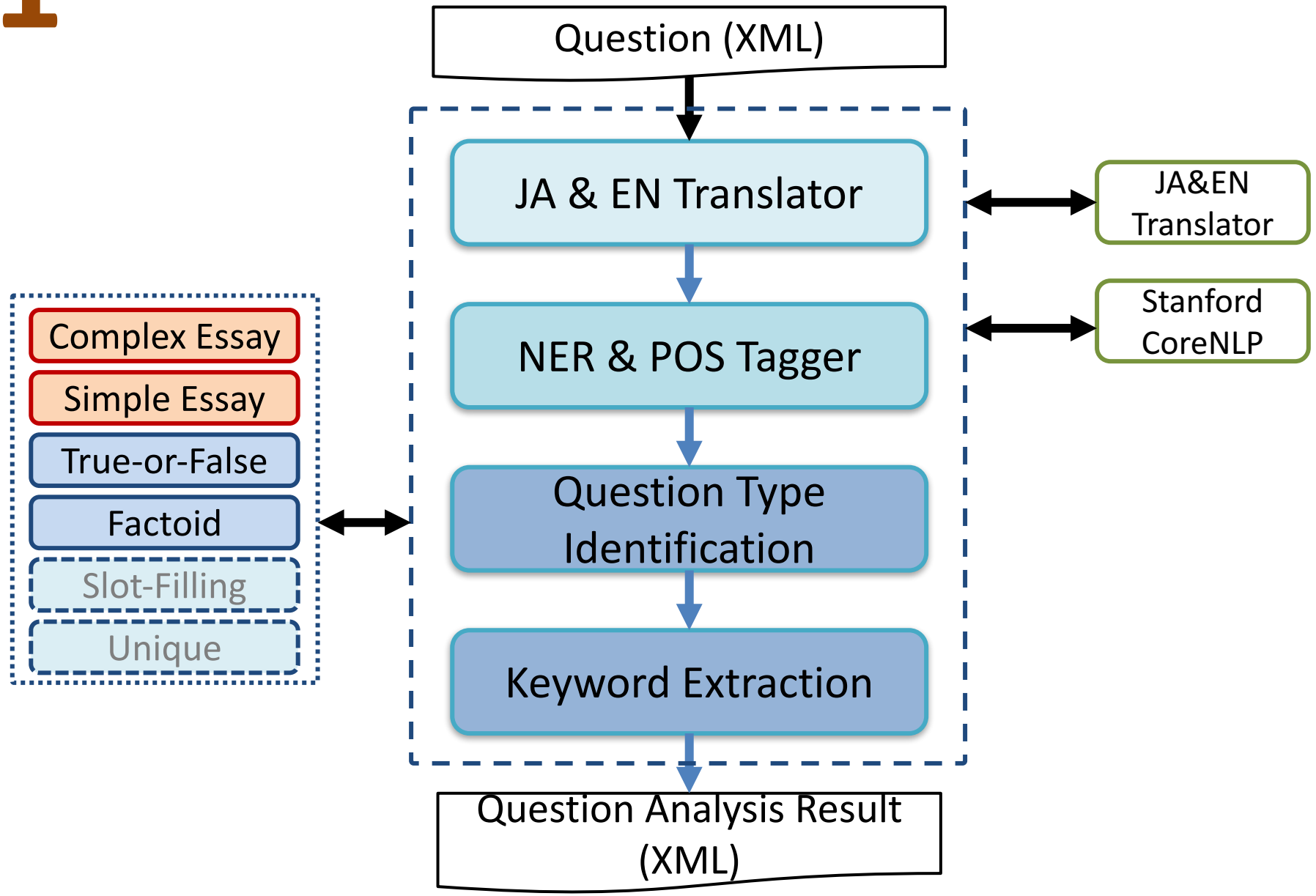
- IMTKU (Information Management at TamKang University) Question Answering System for World History Exams in Japanese university entrance exams at NTCIR-13 QALab-3.
- IMTKU Submitted runs for QALab-3 phase-2
  - 3 English End-to-End multiple-choice
  - 2 English and 2 Japanese End-to-End essay
  - 2 English and 2 Japanese extraction essay
  - 1 English and Japanese summarization essay
- MTKU achieved the best passage precision and the best nugget recall in English Extraction task.

IMTKU System Architecture for NTCIR-13 QALab-3



IMTKU
System Description

1 Question Analysis



JA & EN Translator

JA&EN Translator

Japanese:

古代メソポタミアと古代エジプトにおける暦とその発達の背景について，３行以内で説明しなさい。

English (JA & EN Translator by Google Translate):

Explain the calendar in ancient Mesopotamia and ancient Egypt and the background of its development within 3 lines.

NER & POS tagger

Stanford CoreNLP

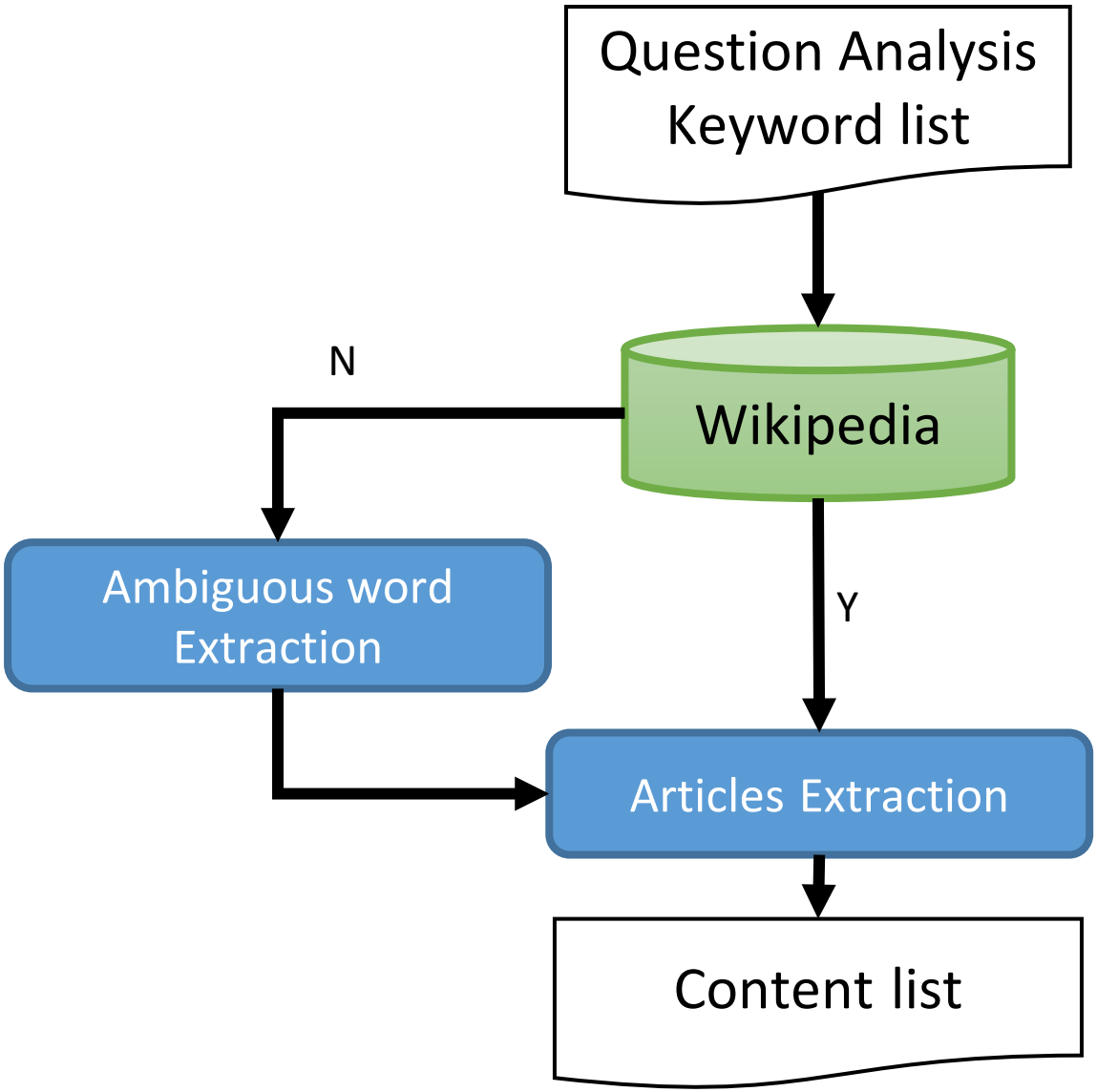
Raw Data:

Wang Anshi, who lived during the Song period, carried out reforms called the New Policies (xin fa).

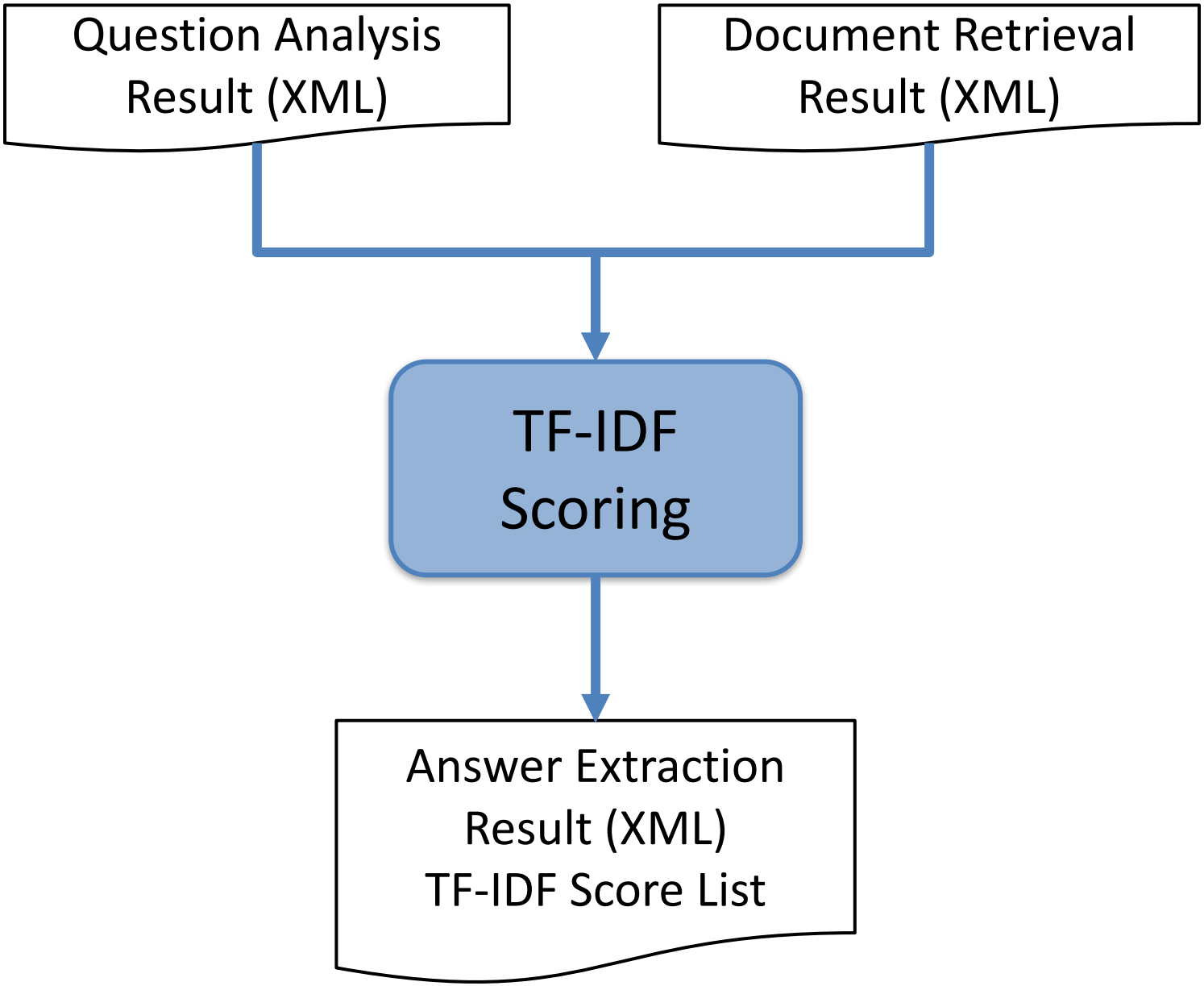
POS tagger and NER:

Wang/PERSON/NNP Anshi/PERSON/NNP ,/O/, who/O/WP lived/O/VBD during/O/IN the/O/DT Song/O/NN period/O/NN ,/O/, carried/O/VBD out/O/RP reforms/O/NNS called/O/VBD the/O/DT New/O/JJ Policies/O/NNS -LRB-/O/-LRB- xin/O/FW fa/O/FW -RRB-/O/-RRB- ./O/.

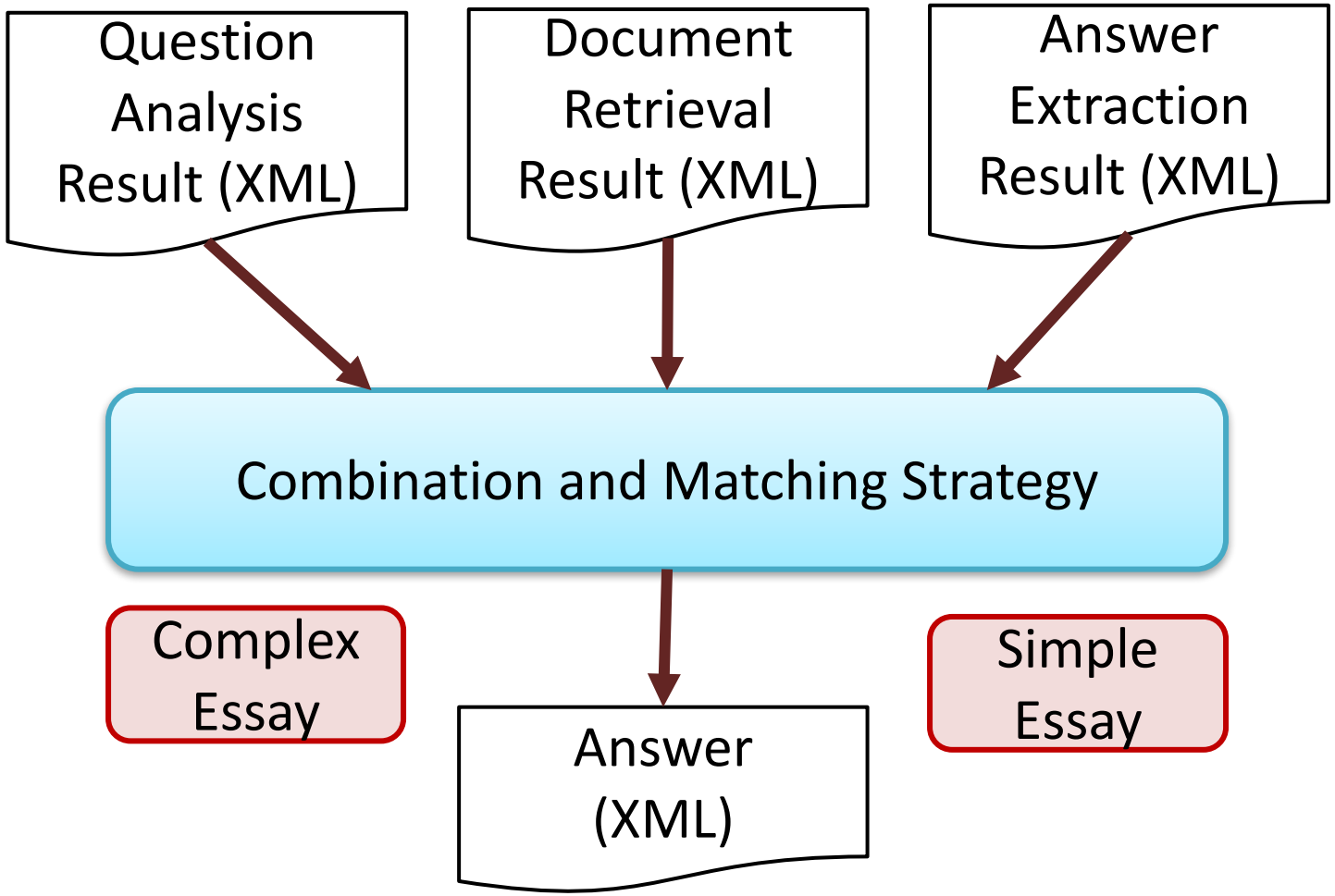
2 Document Retrieval



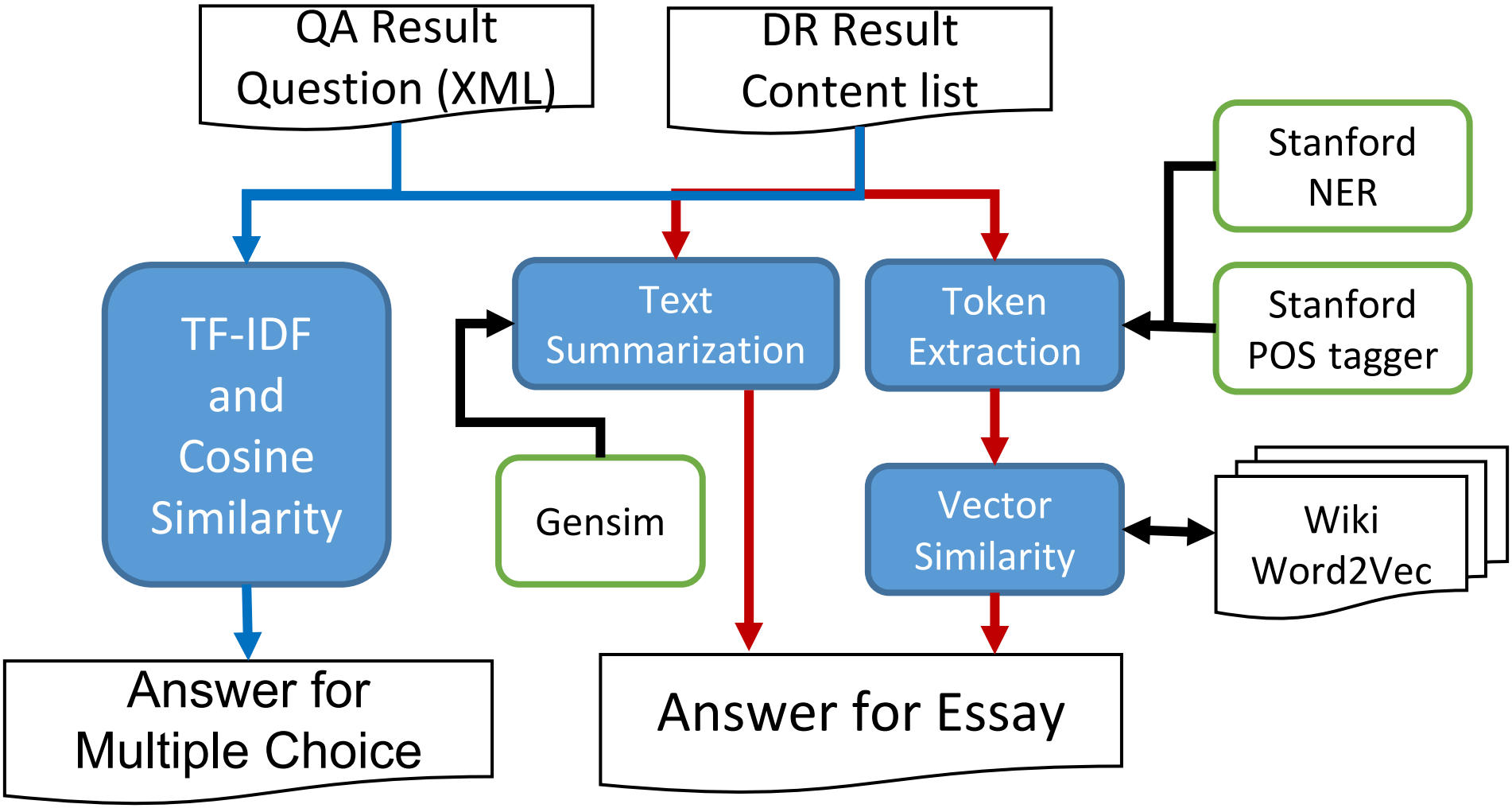
3 Answer Extraction



Answer Generation



4 Answer Generation



IMTKU Phase-2 Official Runs

IMTKU Official Runs	End-to-End (e2e)	extraction	Summarization
Essay	qalab3-en-phase2-answersheet-essay_QALabIMTKU_e2e_01	qalab3-en-phase2-answersheet-essay_QALabIMTKU_extraction_01	qalab3-en-phase2-answersheet-essay_QALabIMTKU_summarization_01
	qalab3-en-phase2-answersheet-essay_QALabIMTKU_e2e_02	qalab3-en-phase2-answersheet-essay_QALabIMTKU_extraction_02	-
	qalab3-ja-phase2-answersheet-essay_QALabIMTKU_e2e_01	qalab3-ja-phase2-answersheet-essay_QALabIMTKU_extraction_01	qalab3-ja-phase2-answersheet-essay_QALabIMTKU_summarization_01
	qalab3-ja-phase2-answersheet-essay_QALabIMTKU_e2e_02	qalab3-ja-phase2-answersheet-essay_QALabIMTKU_extraction_02	qalab3-ja-phase2-answersheet-essay_QALabIMTKU_summarization_02

IMTKU Official Runs	Multiple Choice		
National Center Test	Center-2014--Main-SekaishiB_QALabIMTKU_EN_01	Center-2014--Main-SekaishiB_QALabIMTKU_EN_02	Center-2014--Main-SekaishiB_QALabIMTKU_EN_03

IMTKU at NTCIR-13 QA-Lab3 Phase-3 Performance

Run	Lang.	Correct rate	Total	Total score	Average score
IMTKU RUN01	EN	0.333	12/36	34	0.34
IMTKU RUN02	EN	0.389	**14/36**	**40**	**0.40**
IMTKU RUN03	EN	0.194	7/36	18	0.18

Results of IMTKU multiple-choice questions in Phase-2

IMTKU at NTCIR-13 QA-Lab3 Phase-3 Performance

SYSTEM	IMTKU1QALab3						IMTKU2QALab3					
TYPE	SIMPLE			COMPLEX			SIMPLE			COMPLEX		
METHOD	CASE	STEM	STOP	CASE	STEM	STOP	CASE	STEM	STOP	CASE	STEM	STOP
R-1	0.075	0.077	0.026	0.312	**0.329**	0.131	0.006	0.009	0.012	0.008	0.014	0.013
R-2	0.005	0.007	0	0.052	0.054	0.007	0	0	0	0	0	0
R-S*	0.056	0.057	0.023	0.164	0.167	0.063	0.006	0.009	0.012	0.007	0.012	0.012
R-S4	0.031	0.032	0.015	0.047	0.048	0.025	0.003	0.006	0.008	0.004	0.006	0.007
R-S9	0.007	0.007	0	0.092	0.102	0.013	0	0	0	0	0	0
R-SU*	0.007	0.008	0	0.063	0.069	0.005	0	0	0	0	0	0
R-SU4	0.008	0.009	0	0.073	0.080	0.006	0	0	0	0	0	0
R-SU9	0.009	0.010	0.001	0.094	0.104	0.015	0	0	0	0	0	0
R-L	0.018	0.019	0.003	0.105	0.113	0.027	0	0.001	0.001	0.001	0.002	0.003
R-W1.2	0.015	0.015	0.002	0.095	0.103	0.018	0	0	0	0.001	0.002	0.002

Results of IMTKU English essay questions in Phase-2

IMTKU at NTCIR-13 QA-Lab3 Phase-3 Performance

SYSTEM	IMTKU1QALab3							
TYPE	SIMPLE				COMPLEX			
METHOD	content	text	shortest unit (stem)	shortest unit (root)	content	**text**	shortest unit (stem)	shortest unit (root)
R-1	0.014	0.185	0.175	0.180	0.098	**0.408**	0.347	0.352
R-2	0	0.052	0.040	0.041	0.002	0.164	0.109	0.113
R-S*	0.006	0.147	0.150	0.144	0.070	0.354	0.317	0.308
R-S4	0.005	0.075	0.082	0.079	0.038	0.129	0.119	0.117
R-S9	0	0.041	0.038	0.039	0.006	0.139	0.105	0.108
R-SU*	0.001	0.043	0.041	0.042	0.003	0.144	0.122	0.128
R-SU4	0	0.048	0.049	0.051	0.005	0.158	0.136	0.143
R-SU9	0.001	0.043	0.041	0.042	0.007	0.140	0.106	0.108
R-L	0.003	0.066	0.062	0.064	0.019	0.188	0.160	0.165
R-W1.2	0.002	0.060	0.060	0.062	0.013	0.181	0.155	0.162

Results of IMTKU Japanese essay questions in Phase-2

IMTKU at NTCIR-13 QA-Lab3 Phase-3 Performance

SYSTEM	IMTKU2QALab3							
TYPE	SIMPLE				COMPLEX			
METHOD	content	text	shortest unit (stem)	shortest unit (root)	content	**text**	shortest unit (stem)	shortest unit (root)
R-1	0.004	0.067	0.043	0.050	0.010	**0.146**	0.059	0.075
R-2	0	0.007	0.003	0.003	0	0.022	0.007	0.008
R-S*	0.004	0.049	0.041	0.048	0.009	0.124	0.058	0.071
R-S4	0.003	0.028	0.026	0.030	0.006	0.043	0.022	0.027
R-S9	0	0.006	0.002	0.003	0	0.027	0.006	0.008
R-SU*	0	0.004	0.001	0.002	0	0.016	0.003	0.005
R-SU4	0	0.004	0.001	0.002	0	0.018	0.004	0.006
R-SU9	0	0.007	0.003	0.004	0	0.028	0.006	0.009
R-L	0.001	0.013	0.006	0.008	0.002	0.037	0.012	0.016
R-W1.2	0.001	0.010	0.004	0.006	0.001	0.030	0.008	0.012

Results of IMTKU Japanese essay questions in Phase-2

IMTKU at NTCIR-13 QA-Lab3 Extraction task at Phase 2 (N=5 and N = 10)

Run	Lang.	Passage Precision	Nugget Recall	Ave. of Tokens
IMTKU RUN01	EN	**0.260**	**0.061**	249.2
IMTKU RUN02	EN	0.234	0.058	249.2

Conclusions

- **IMTKU Question Answering System for World History Exams at NTCIR-13 QALab-2**
- **IMTKU Submitted runs for QALab-3 phase-2**
  - **3 English End-to-End multiple-choice**
  - **2 English and 2 Japanese End-to-End essay**
  - **2 English and 2 Japanese extraction essay**
  - **1 English and 1 Japanese summarization essay**
- **MTKU achieved the best passage precision and the best nugget recall in English Extraction task.**

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Q&A

Tamkang University
淡江大學

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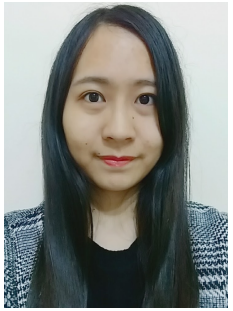

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