Tamkang University

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

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Tamkang University

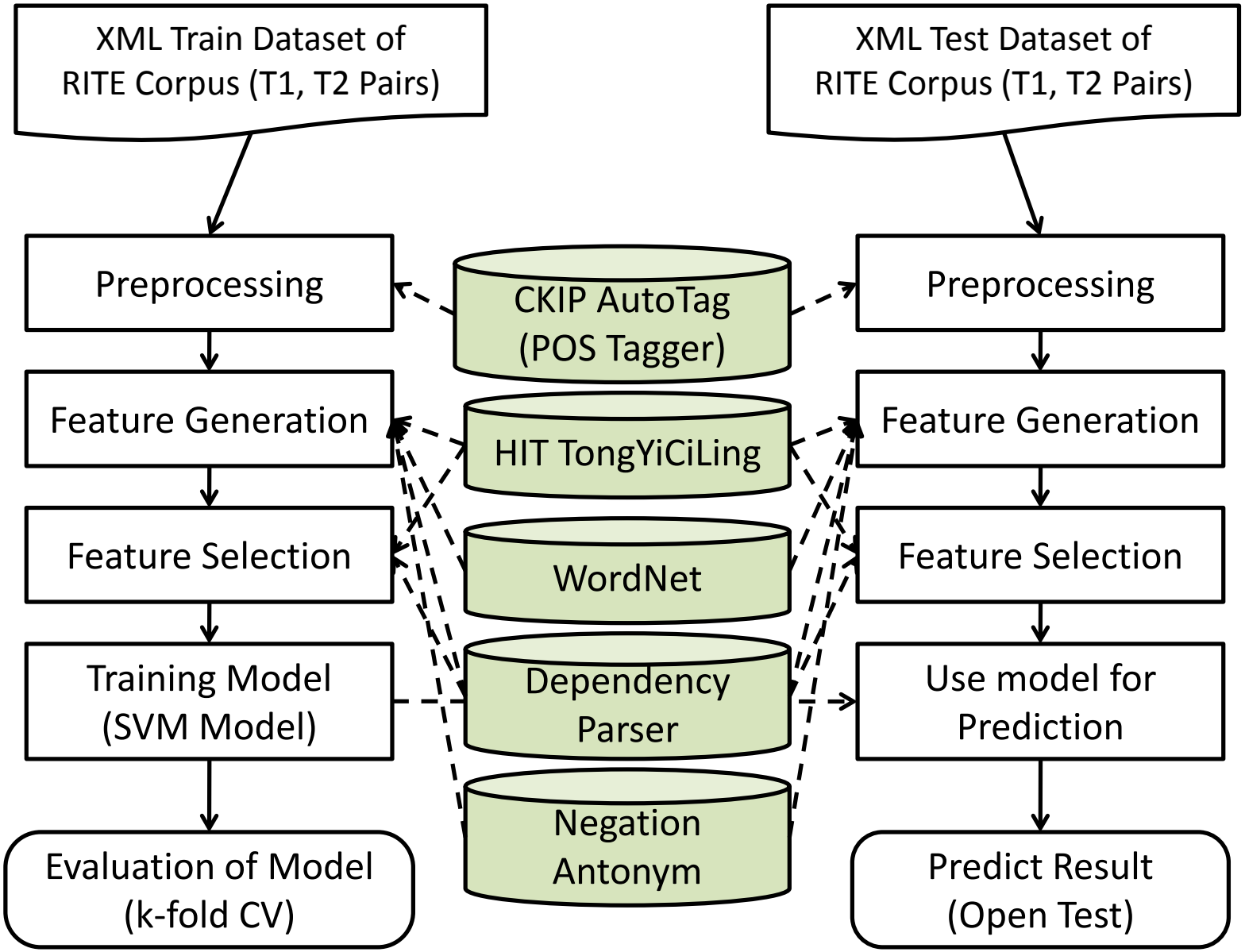
Outline

- IMTKU RITE System Architecture
- Highlight of Features
  - Syntactic and Semantic Features
- Performance and Discussion
- Demo of RITE.IM.TKU
- Call for participating in IEEE EM-RITE 2013, 2014, 2015, …

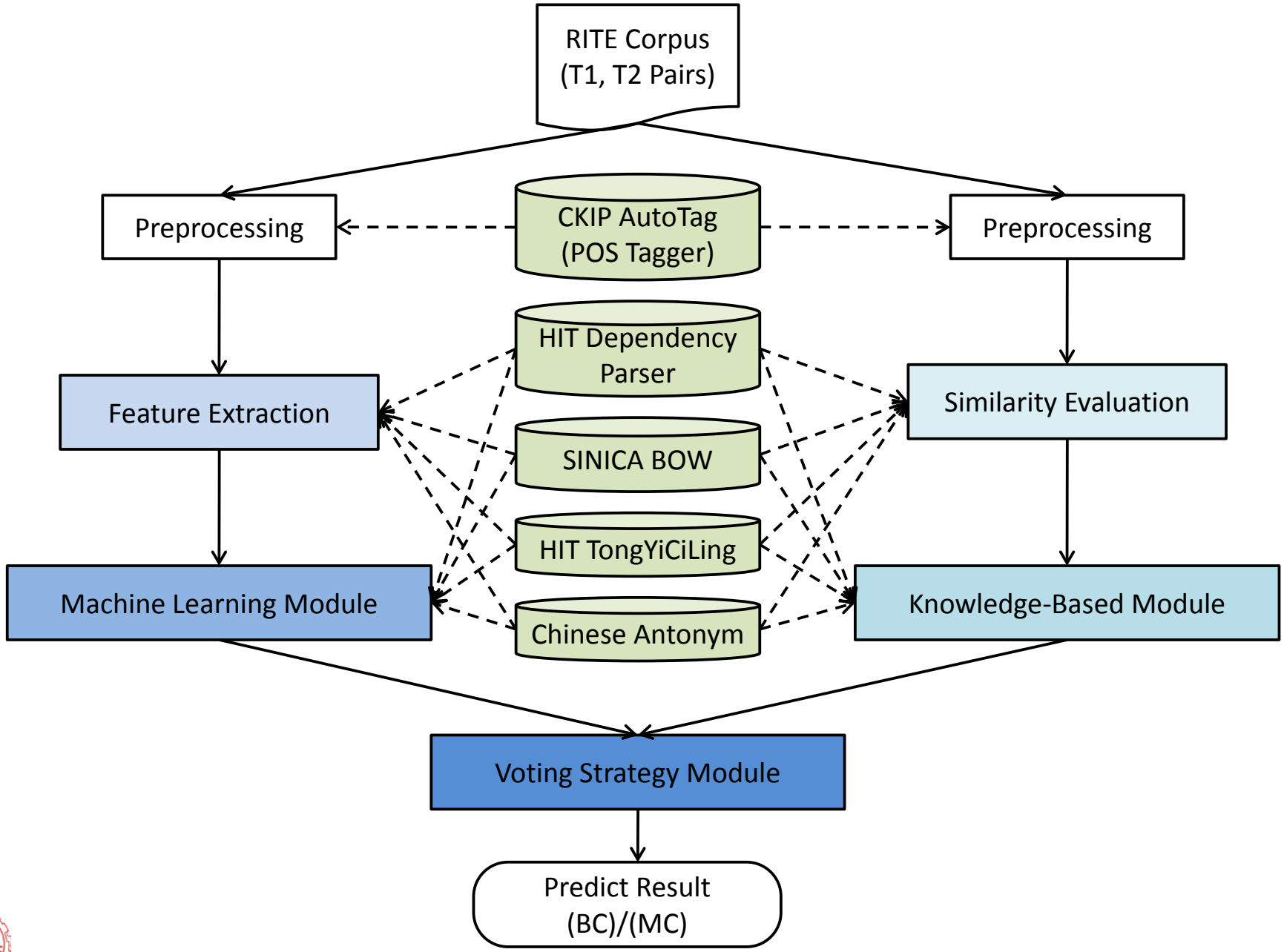
Overview

- IMTKU (**I**nformation **M**anagement at **T**am**K**ang **U**niversity) textual entailment system for recognizing inference in text at NTCIR-10 RITE-2 (Recognizing Inference in Text)
- Hybrid approach
  - integrate semantic features and machine learning techniques for recognizing inference in text at NTCIR-10 RITE-2 task
- We submitted 3 official runs for BC, MC and RITE4QA subtask
- IMTKU is ranked #1 in the CS-RITE4QA subtask of NTCIR-10 RITE-2 task

IMTKU System Architecture for NTCIR-10 RITE-2



IMTKU System Architecture for NTCIR-9 RITE



Semantic and Syntactic features

1. String Length/Length Difference/Ratio
2. Longest Common Substring
3. Char-based Edit Distance
4. Word Length/Difference/Ratio
5. Word-based Edit Distance
6. Noun/Verb Number
7. Word Semantic (Synonym) Similarity
8. WordNet Similarity
9. Negation
10. Antonym
11. Dependency Parser

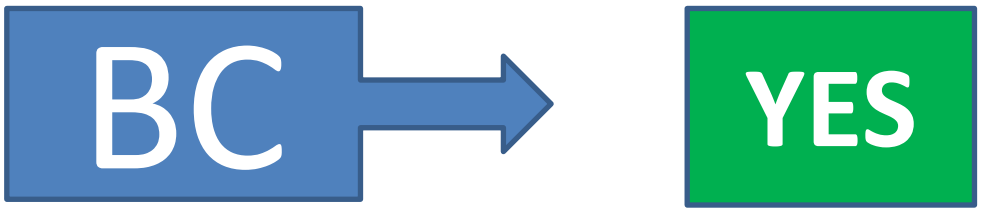
Recognizing Inference in Text (RITE)

T1: 香港的主權和領土是在1997由英國歸還給中國的

(T1: Hong Kong's sovereignty and territories were returned to China by the United Kingdom in 1997.)

T2: 1997年香港回歸中國

(T2: Hong Kong was returned to China in 1997.)



Recognizing Inference in Text (RITE)

T1: 車諾比病毒在1999年4月總共造成**超過**200萬台電腦無法開機

(T1: CIH caused severe boot problems in **more than** 200 million computers in April, 1999)

T2: 1999年4月車諾比病毒總共造成**逾**200萬台電腦無法開機

(T2: CIH caused severe boot problems in **over** 200 million computers in April, 1999)

Recognizing Inference in Text (RITE)

T1: 車諾比病毒在1999年4月總共造成超過200萬台電腦無法開機

(T1: CIH caused severe boot problems in more than 200 million computers in April, 1999)

T2: 1999年4月車諾比病毒總共造成逾200萬台電腦無法開機

(T2: CIH caused severe boot problems in over 200 million computers in April, 1999)

Word Semantic (Synonym) Similarity HIT TYCCL

- 19 synonyms of "World"(世界)
  - Di01A01=世界, 世, 世上, 大地, 天下, 天底下, 全世界, 環球, 全球, 舉世, 中外, 寰宇, 五洲, 海內, 海內外, 五湖四海, 大千世界, 大世界, 普天之下
  - TYCCL Scoring Function:
    - ((t–r) + 1) / t
    - ((19-1)+1)/19 = 19/19 = 1
  - World 世界
    - Di01A01=|世界:1.0000,
      Di14C04=|世風:0.5000,
      Dd05B03=|領域:0.3333

Negation

- **52** Chinese negation words list
- Examples:
  - 沒
  - 不
  - 否
  - 無
  - 非
  - 未
  - 免
  - 別
  - 莫
  - …
  - 沒有
  - 無法
  - 尚未
  - 未可
  - 未得
  - 未必
  - 未聞
  - 未有
  - 未定
  - …

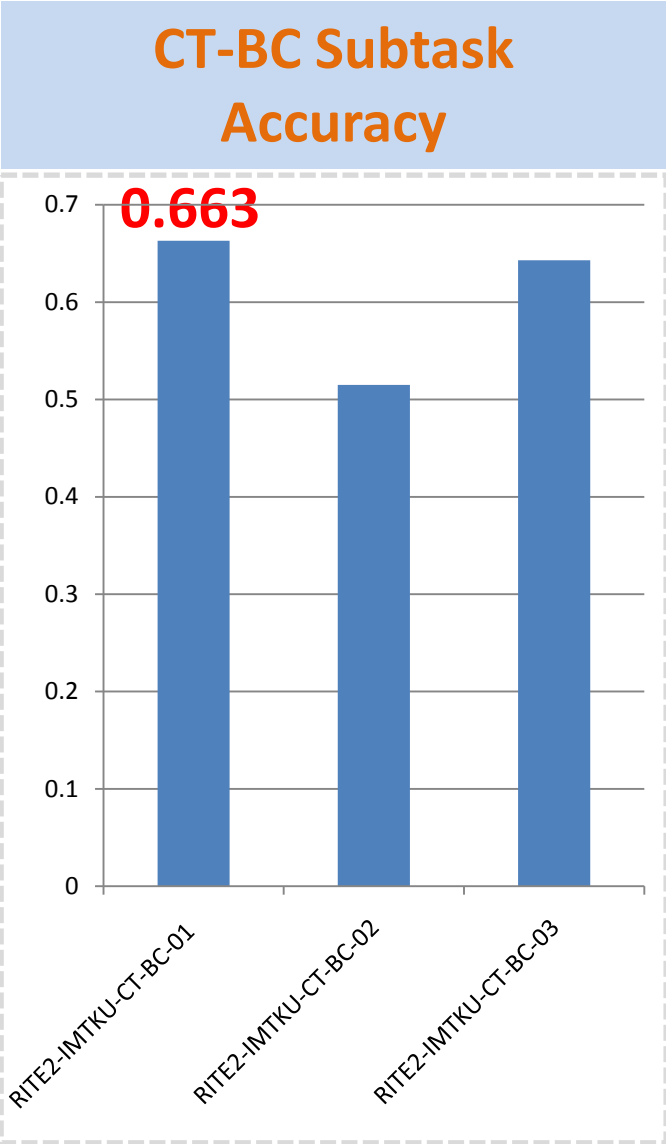
Antonym

- **568** antonym pair list
- Examples:
  - 開心　　苦悶
  - 開心　　傷心
  - 開心　　難過
  - 快樂　　難過
  - 快樂　　傷心
  - 高興　　傷心
  - 高興　　難過
  - 高興　　痛苦
  - 幸福　　痛苦
  - 高興　　憤怒
  - 高興　　掃興
  - …

IMTKU BC Subtask Official Runs

IMTKU Subtask Official Runs	Resources	Features
RITE-2-IMTKU-CT-BC-01 RITE-2-IMTKU-CS-BC-01	Bilingual Wordnet, HIT TongYiCiLing, Stanford Parser	Antonym, Negation, Word Based Similarity, Token Based Similarity, Lexical overlap, Text Pair Length, Token Length, WorkNet Similarity, Tree Edit Distance
RITE-2-IMTKU-CT-BC-02 RITE-2-IMTKU-CS-BC-02	Bilingual Wordnet, HIT TongYiCiLing	Antonym, Negation, Word Based Similarity, Token Based Similarity, Lexical overlap, Text Pair Length, Token Length, WorkNet Similarity
RITE-2-IMTKU-CT-BC-03 RITE-2-IMTKU-CS-BC-03	Stanford Parser	All syntactic and semantic features (except Stanford Parser)

IMTKU at NTCIR-10 RITE-2 Task Performance

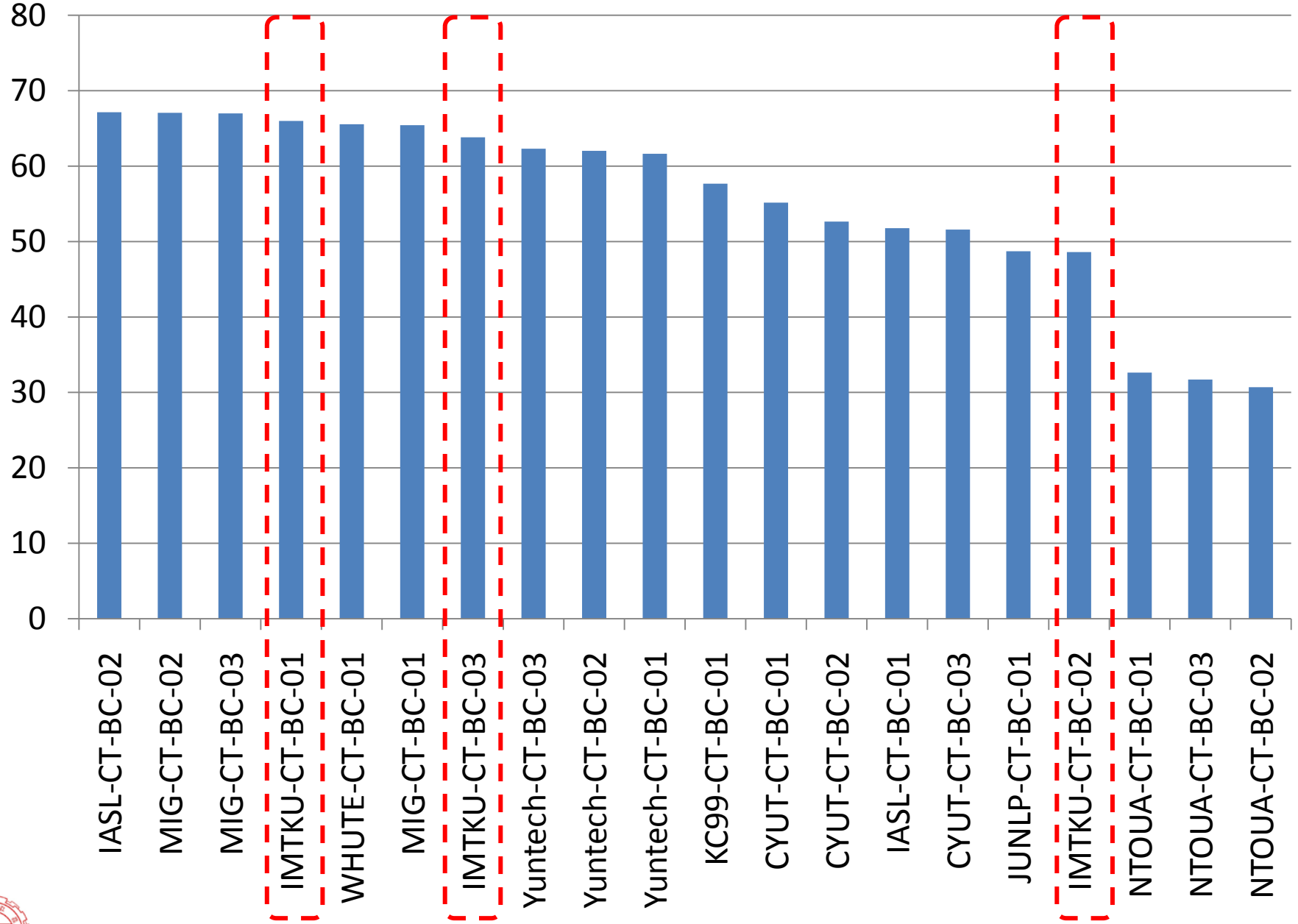


RITE-2-IMTKU-CT-BC-01

Bilingual Wordnet,
HIT TongYiCiLing,
Stanford Parser

Antonym, Negation, Word Based Similarity, Token Based Similarity, Lexical overlap, Text Pair Length, Token Length, WorkNet Similarity, Tree Edit Distance

NTCIR-10 RITE-2 CT-BC

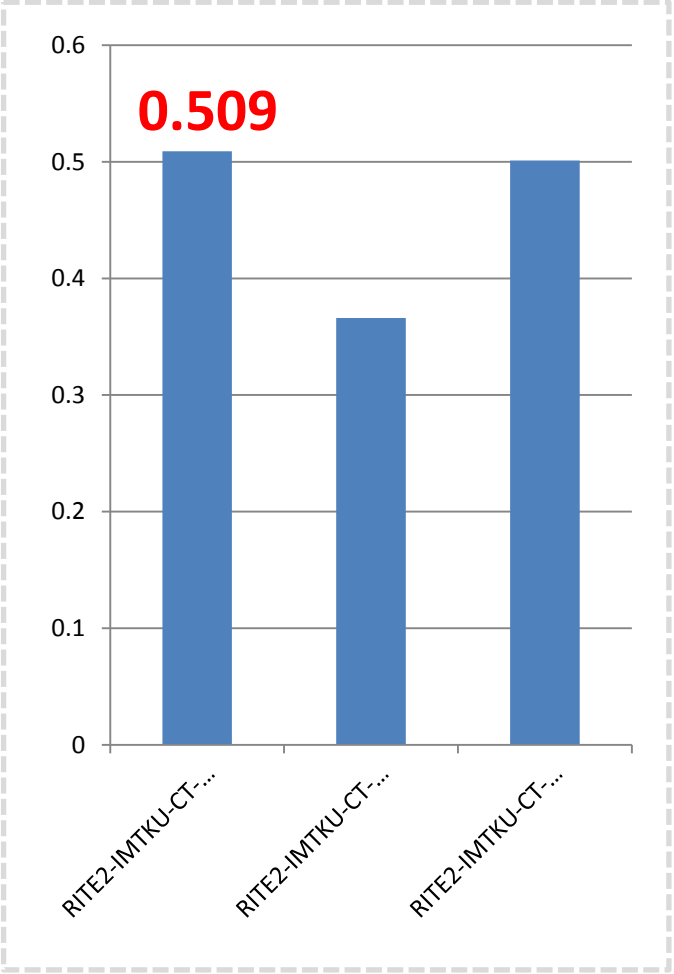


IMTKU MC Subtask Official Runs

IMTKU Subtask Official Runs	Resources	Features
RITE-2-IMTKU-CT-MC-01 RITE-2-IMTKU-CS-MC-01	Stanford Parser	Longest Common Substring, Word Length Ratio, Text Length, Similarity between t1 and t2, Tree Edit Distance
RITE-2-IMTKU-CT-MC-02 RITE-2-IMTKU-CS-MC-02	Bilingual Wordnet, HIT TongYiCiLing, Stanford Parser	Integrated Semantic features and Machine Learning Approach
RITE-2-IMTKU-CT-MC-03 RITE-2-IMTKU-CS-MC-03	Bilingual Wordnet, HIT TongYiCiLing	Longest Common Substring, Word Length Ratio, Text Length, Similarity between t1 and t2, Tree Edit Distance

IMTKU at NTCIR-10 RITE-2 Task Performance

CT-MC Subtask Accuracy



RITE-2-IMTKU-CT-MC-01

Stanford Parser

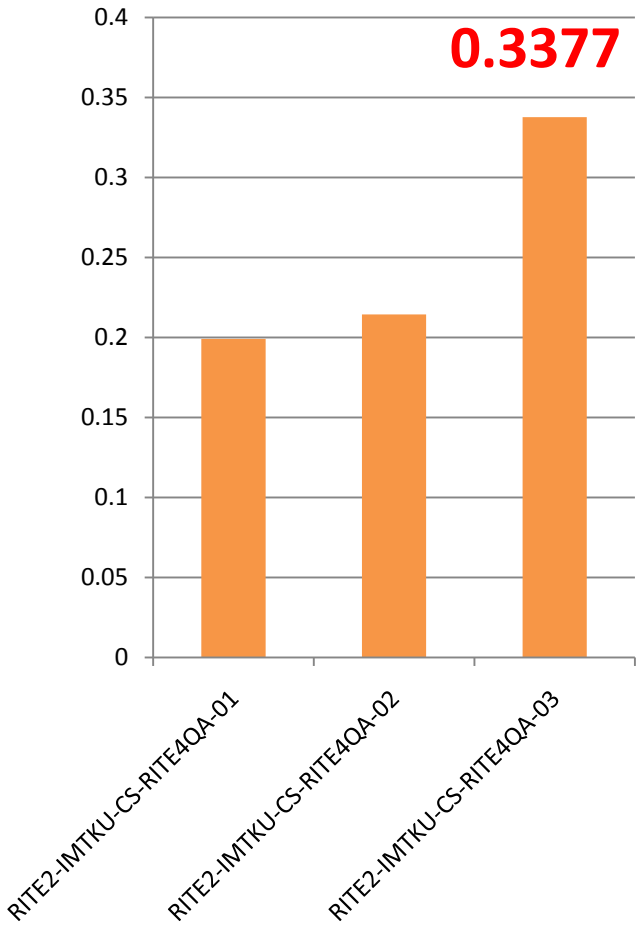
Longest Common Substring,
Word Length Ratio,
Text Length,
Similarity between t1 and t2,
Tree Edit Distance

IMTKU RITE4QA Subtask Official Runs

IMTKU Subtask Official Runs	Resources	Features
RITE-2-IMTKU-CT-RITE4QA-01 RITE-2-IMTKU-CS-RITE4QA-01	Stanford Parser	Antonym, Negation, Word Based Similarity, Token Based Similarity, Lexical overlap, Text Pair Length, Token Length, WorkNet Similarity
RITE-2-IMTKU-CT-RITE4QA-02 RITE-2-IMTKU-CS-RITE4QA-02	Bilingual Wordnet, HIT TongYiCiLing	Antonym, Negation, Word Based Siilarity, Token Based Similarity, Lexical overlap, Text Pair Length, Token Length
RITE-2-IMTKU-CT-RITE4QA-03 RITE-2-IMTKU-CS-RITE4QA-03	HIT TongYiCiLing	Longest Common Substring, Text Length, Text Length Ratio, Antonym, Negation

IMTKU at NTCIR-10 RITE-2 Task Performance

CS-RITE4QA Subtask MRR

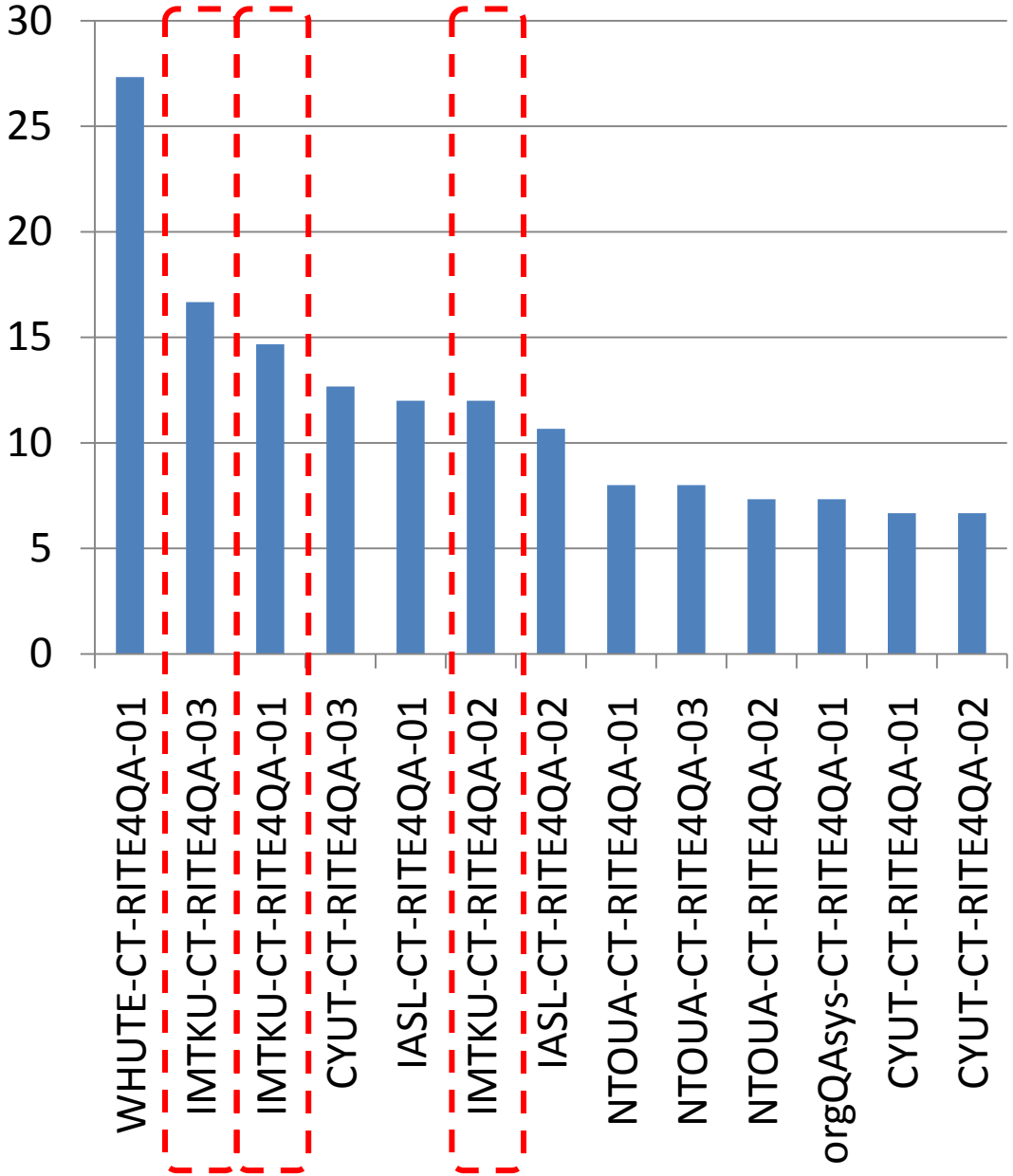


RITE-2-IMTKU-CS-RITE4QA-03

HIT TongYiCiLing

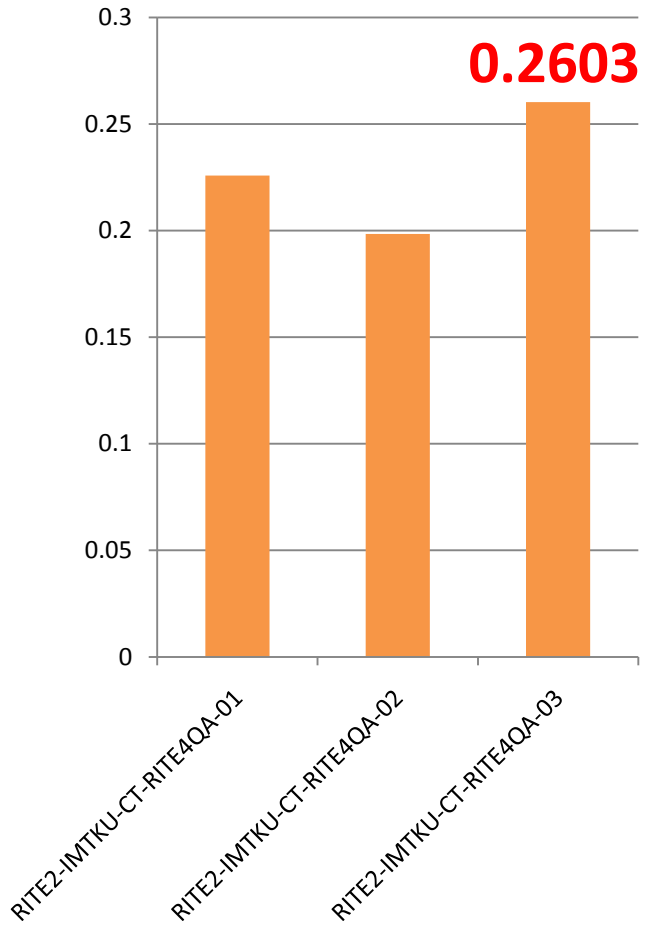
Longest Common Substring, Text Length, Text Length Ratio, Antonym, Negation

NTCIR-10 RITE-2 CT-RITE4QA



IMTKU at NTCIR-10 RITE-2 Task Performance

CT-RITE4QA Subtask MRR

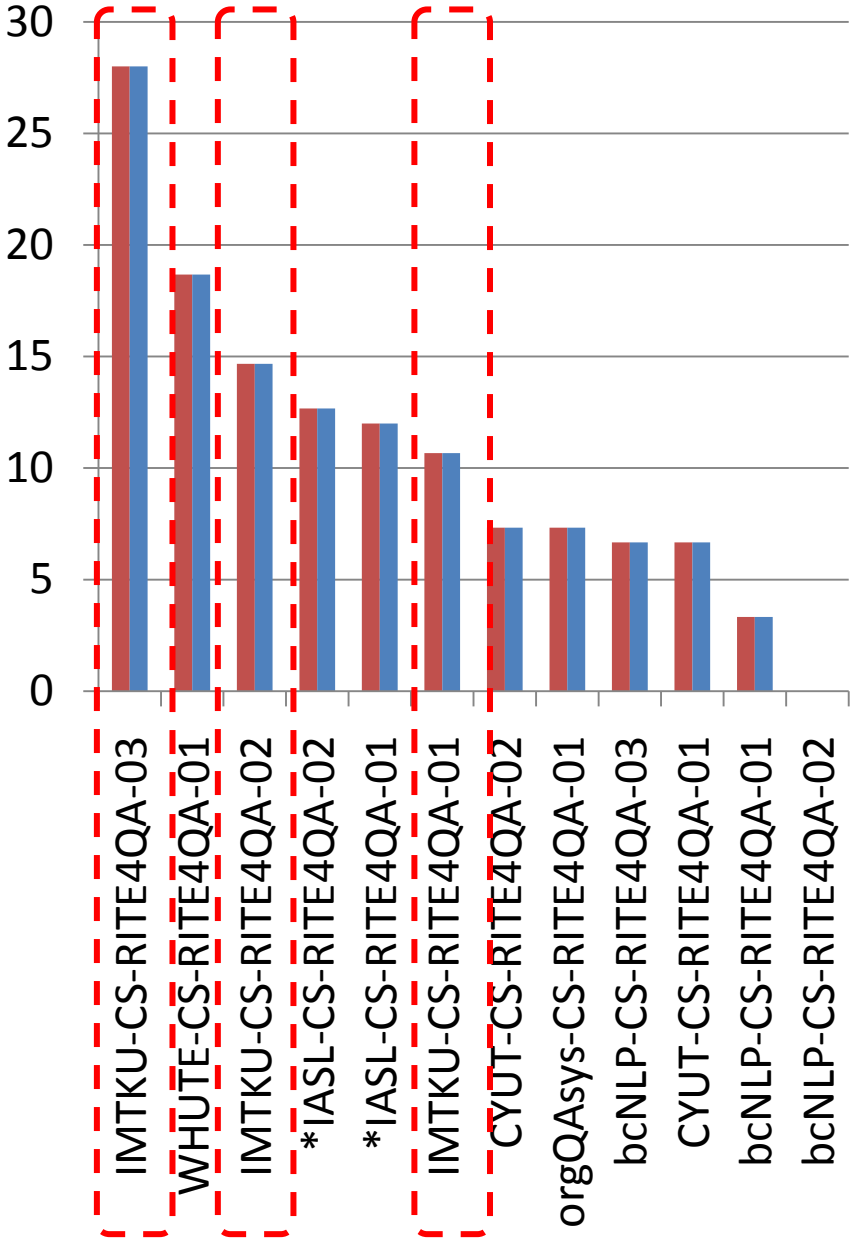


RITE-2-IMTKU-CT-RITE4QA-03

HIT TongYiCiLing

Longest Common Substring, Text Length, Text Length Ratio, Antonym, Negation

NTCIR-10 RITE-2 CS-RITE4QA



Discussions

- Issues of Definition in RITE MC between NTCIR-9 and NTCIR-10:
  - Definition of NTCIR-9 MC subtask :
    - "A **5-way** labeling subtask to detect (forward / reverse / bidirection) entailment or no entailment (contradiction / independence) in a text pair."
  - Definition of NTCIR-10 MC subtask :
    - "A **4-way** labeling subtask to detect (forward / bidirection) entailment or no entailment (contradiction / independence) in a text pair."
  - Misused NTCIR-9 MC labels on NTCIR-10 MC test datasets where "Reverse" label should be excluded.

IMTKU Experiments for NTCIR-10 RITE-2 Datasets

Datasets	10 Fold CV Accuracy
RITE2_CT_dev_test_bc_g.txt (RITE2 BC Dev + Test Dataset: 1321 + 881 = 2202 pairs)	68.85%
RITE1_CT_r1000_dev_test_bc_g.txt (Random select **1000 pairs** from RITE1 BC Dev+ Test Dataset)	**73.83%**
RITE1_CT_dev_test_bc_g.txt (RITE1 BC Dev +Test Dataset: 421 + 900 =1321 pairs)	72.29%
RITE1_CT_dev_bc_g.txt (gold standard) (RITE1 BC Development Dataset: 421 pairs)	72.21%

IMTKU Experiments for NTCIR-9 RITE Datasets

Datasets	10 Fold CV Accuracy
RITE1_CT_dev_bc_g.txt (gold standard) (BC Development Dataset: **421** pairs)	**76.48%**
RITE1_CT_test_bc_g.txt (BC Test Dataset: **900** pairs)	66.33%
RITE1_CT_dev_test_bc_g.txt (BC Dev+Test Dataset: 421+900 =**1321** pairs)	67.67%

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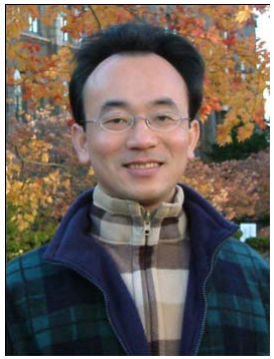
Demo

http://rite.im.tku.edu.tw



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2013/06/19
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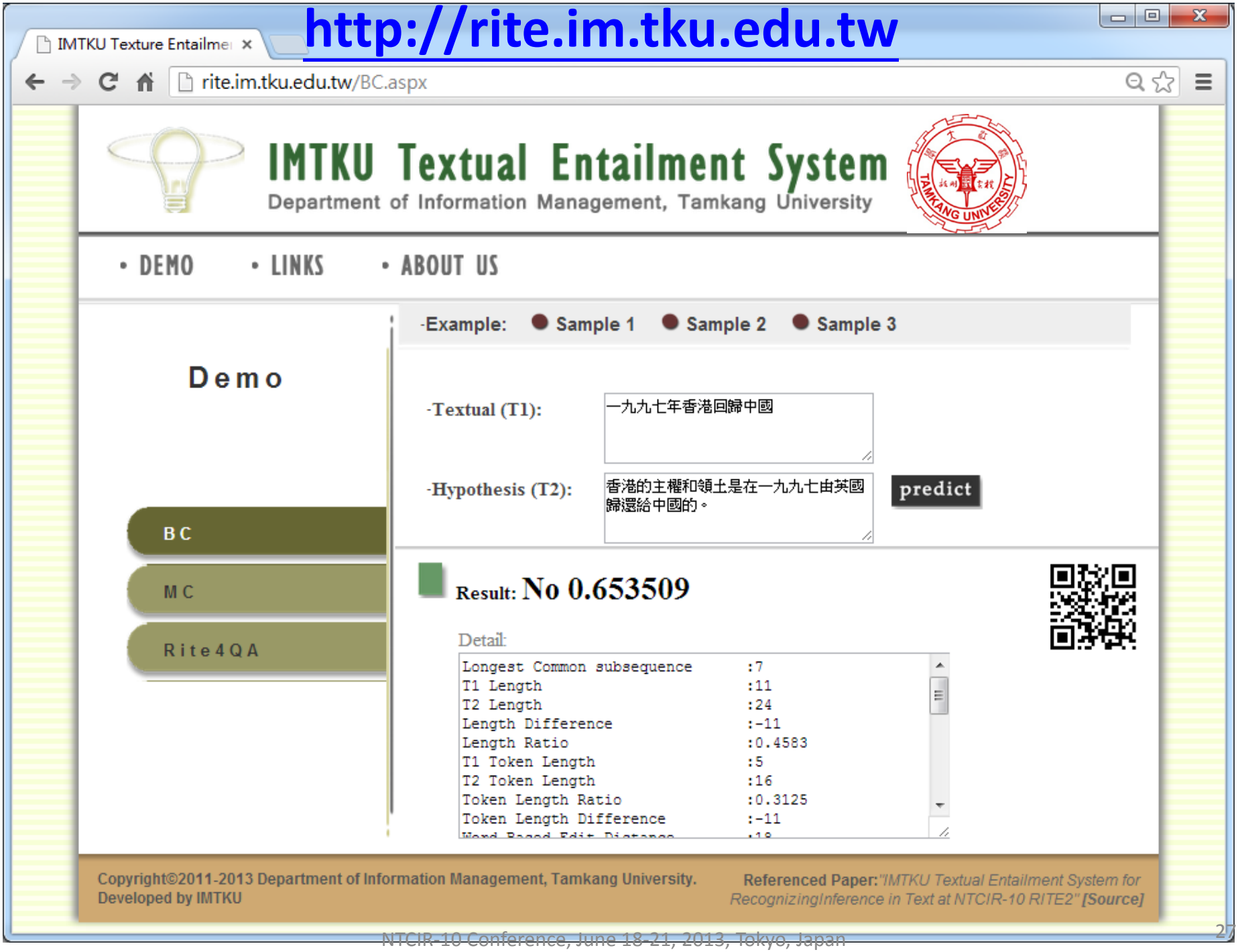

http://rite.im.tku.edu.tw

IMTKU Texture Entailme

rite.im.tku.edu.tw/BC.aspx

IMTKU Textual Entailment System

Department of Information Management, Tamkang University

• DEMO • LINKS • ABOUT US

Demo

- BC
- MC
- Rite4QA

-Example: Sample 1 Sample 2 Sample 3

-Textual (T1): 一九九七年香港回歸中國

-Hypothesis (T2): 香港的主權和領土是在一九九七由英國歸還給中國的。

predict

Result: No 0.653509

Detail:

```
Word Similarity                 :0.8747
Word Net Similarity             :18.55
Word Net Similarity Ratio       :23.0833333333333
Word Net Similarity Short       :30.3333333333333
Negation Number Difference      :0
Antonym Number Difference       :0
T1: 一九九七年香港回歸中國
T2: 香港的主權和領土是在一九九七由英國歸還給中國的。
T1 CKIP:   ?(QUESTIONCATEGORY)  一九九七年(N)  香港(N)
  回歸(Vt)  中國(N)
```


Referenced Paper:"IMTKU Textual Entailment System for RecognizingInference in Text at NTCIR-10 RITE2" [Source]

https://sites.google.com/site/emrite2013/

IEEE International Workshop on Empirical Methods for Recognizing Inference in TExt (IEEE EM-RITE 2013)

In conjunction with IEEE IRI 2013

San Francisco, USA
August 14, 2013

https://sites.google.com/site/emrite2013/

IEEE EM-RITE 2013

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MENU

- Call for papers
- Important dates
- Organizing committee
- Paper Submission
- Workshop Program

LINKS

- IEEE IRI 2013
- IEEE EM-RITE 2013
- IEEE EM-RITE 2012

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Welcome to IEEE EM-RITE 2013

IEEE International Workshop on Empirical Methods for Recognizing Inference in TExt (IEEE EM-RITE 2013)

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San Francisco, USA
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Textual Entailment and Paraphrase are inference tasks of natural language processing (NLP) for automatically detecting entailment, paraphrase, and contradiction in texts. The aim of this workshop is to provide a forum for original high-quality research contributions on empirical methods for recognizing inference in text as well as multidisciplinary research opportunities.

Topics of interest include but are not limited to practical areas that span a variety of aspects of empirical methods for recognizing inference in text including:

- Guidelines, standards, best practices and models for the construction and annotation of Textual Entailment datasets
- Evaluation of Knowledge Resources for Textual Entailment
- Recognizing Inference in Text
- Recognizing Textual Entailment

Conclusions

- Issues of definitions and datasets at NTCIR9-RITE and NTCIR-10 RITE-2
- Online demo system **RITE.IM.TKU**
  - http://rite.im.tku.edu.tw
- Welcome to join **IEEE EM-RITE** 2013, 2014, 2015, …

Q & A

Tamkang University

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