In this paper, we describe the IMTKU (Information Management at TamKang University) textual entailment system for recognizing inference in text at NTCIR-9 RITE (Recognizing Inference in Text). We proposed a textual entailment system using a hybrid approach that integrate knowledge based and machine learning techniques for recognizing inference in text at NTCIR-9 RITE task. We submitted 3 official runs for both BC and MC subtask. In NTCIR-9 RITE task, IMTKU team achieved 0.522 in the CT-MC subtask and 0.556 in the CT-BC subtask. For RITE4QA subtask, the best MRR of IMTKU team is 0.3998 in CS-RITE4QA and 0.3992 in CT-RITE4QA subtask.

### Performance

<table>
<thead>
<tr>
<th>System</th>
<th>Subtask</th>
<th>Accuracy</th>
<th>MRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMTKU BC Subtask</td>
<td>RITE1-IMTKU-CT-BC-01</td>
<td>0.550</td>
<td>0.522</td>
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<tr>
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<td>RITE1-IMTKU-CT-BC-02</td>
<td>0.556</td>
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<td></td>
<td>RITE1-IMTKU-CT-BC-03</td>
<td>0.524</td>
<td>0.268</td>
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<tr>
<td>IMTKU MC Subtask</td>
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<td>RITE1-IMTKU-CT-MC-02</td>
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<td></td>
<td>RITE1-IMTKU-CT-MC-03</td>
<td>0.268</td>
<td></td>
</tr>
</tbody>
</table>

### Discussion

Issues of Definition and Data Conversion in RITE MC and BC datasets:
- **Definition of MC subtask**: A 5-way labeling subtask to detect (forward / reverse / bidirection) entailment or no entailment (contradiction / independence) in a text pair.
  - (Incorrect conversion: "F/R/B/Y, "C/I" in dependence) in a text pair.
- **Definition of BC subtask**: Given a text pair (t1,t2) identify whether t1 entails (inference) a hypothesis t2 or not.
  - (Correct conversion: "F/R/Y, "C/I")

Cross Validation of Development and Test datasets of RITE BC-CT Subtask

### Methods for Official Runs

**RITE-IMTKU-CT-BC Subtask**
- **Task**: CPE Parsing, HT Dependency Parser, LibSVM
- **Resources**: English Wordnet (SINICA BOW), HIT (Hybrid Approach): Integrated Knowledge Base and Machine Learning Approach
- **Features**:anneal length, T1 Text Based Similarity, Textual overlap, T1 Edit Length, T1 Length

**RITE-IMTKU-CT-MC Subtask**
- **Task**: CPE Parsing, HT Dependency Parser, LibSVM
- **Resources**: English Wordnet (SINICA BOW), HIT (Hybrid Approach): Integrated Knowledge Base and Machine Learning Approach
- **Features**: Textual overlap, T1 Length, T2 Length, T1 Text Based Similarity, Textual overlap, T2 Length

**RITE-IMTKU-CS-RITE4QA Subtask**
- **Task**: CPE Parsing, HT Dependency Parser, LibSVM
- **Resources**: English Wordnet (SINICA BOW), HIT (Hybrid Approach): Integrated Knowledge Base and Machine Learning Approach
- **Features**: Textual overlap, T1 Length, T2 Length, T1 Text Based Similarity, Textual overlap, T2 Length

### Tools and Resources

- **Tools**: CKIP AutoTag, LibSVM
- **Resources**: Bilingual Wordnet (SINICA BOW), HIT TongYiCiLing (HIT-TYCL), NONE

**System Architecture**

**Performance**

**Discussion**

**Datasets**

- RITE1_CT_dev_bc_g.txt (gold standard)
- RITE1_CT_test_bc_g.txt

**10 Fold CV Accuracy**

- RITE1_CT_dev_bc_g.txt (gold standard)
- RITE1_CT_test_bc_g.txt (BC Dev Dataset: 421 pairs)
- RITE1_CT_test_bc_g.txt (BC Test Dataset: 900 pairs)
- RITE1_CT_dev_bc_g.txt (BC Dev+Test Dataset: 1321 pairs)

**DEMO**

http://rite.imtku.edu.tw

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