KitAi-QA: a Question Answering System for NTCIR-12 QALab-2

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Contents

• Outline of our system

• Methods in the system
  – Question type identification
  – Scoring
  – Answer selection

• Experiment result and discussion

• Summary
Outline of KitAi-QA

Solving the National Center Test
  – Multiple choice question
  – Some question types

1. Identify the question type.
2. Extract a related topic from the textbook
3. Select an answer for four question types
Question Type Identification

● Classify questions into five question types

- True-or-False
- Factoid
- Slot-filling
- Unique Time
- Unique Image

● Key phrase-based rules

Question:
ヨーロッパの主要参戦国の方況を述べた次の文(following sentences)の中から、
誤りを含む(containing the incorrect one)ものの一つ選び。

True-or-False
Scoring

- Extract a related topic from the textbook
  - Compute scores for each topic

Textbook

**Topic 1:** French Revolution  
Score: 0.7

**Topic 2:** World War I  
Score: 0.3

**Topic 3:** Ming Dynasty  
Score: 1.2

Choice

Ming dynasty sent troops to Mongolian Plateau

Related Topic of the choice
Score Calculation

- **Keyword based scoring**

  Choice:
  明朝は、モンゴル高原に出兵した。
  (Ming dynasty sent troops to Mongolian Plateau)

  Topic
  明朝(Ming dynasty)の永楽帝は積極的な対外政策をとり、
  北方でモンゴル高原に出兵した（sent troops to Mongolian Plateau）。

  Same Keyword
  Same Dependency
Answer Selection

● Factoid and Slot-filling (Selecting a word)
  — Select the most frequent word which is in a related topic

● Unique Time (Sort of events by chronological order)
  — Use time information which is in related topics

● True-or-False (Selecting a true or false choice)
  — Use scores of related topics of each choice
  — Detect conflict and events
True-or-False

Select a true or false choice
-need to judge whether each choice is fact or not

Q. 農村や都市について述べた文として最も適当なものを次のうちから選べ (select a true choice)

A. 11世紀に、イギリスでは牧羊を目的に囲い込みが行われた
B. 12世紀に、エルベ川以東に、農場領主制が広まった
C. ギルドは、生産・流通の自由競争を保障するために組織された
D. ハンザ同盟は、リューベックを盟主とした
Process for True-or-False

- Score based fact validation
  - The highest score choice is true

- Choice: Poison gas was used in WWII
  - Score: 1.1

Textbook
- Topic 1: French Revolution
  - Score: 0.7
- Topic 2: Weapon of WWI
  - Score: 1.1
- Topic 3: Ming dynasty
  - Score: 0.5
Process for True-or-False

- Score based fact validation
  - The highest score choice is true

Choice: Poison gas was used in WWII

Score: 1.1
Tag: Fact or Conflict

Use for Final Decision
Conflict Detection

Detect a conflict in a choice

Choice
イタリアでは、1930年代にムッソリーニがファシスト政権を樹立した。

Time conflict

Related Topic
ムッソリーニは1922年、ファシスト党による「ローマ進軍」を組織して政府に圧力をかけ、国王の指示で首相に任命された。

Tag: Conflict
Event Detection

- Focus on the relation between events
- Use definition in event ontology

Event Detection

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Textbook

B lost against A

Choice

A defeated B

Entailed event

Tag: Fact

Event Detection

• Focus on the relation between events
• Use definition in event ontology

Textbook
A lost against B

Choice
A defeated B

Conflict event

Tag: Conflict

Final Decision

Choices are ranked on the basis of scores and tags

If a question is to select a true...

If a question is to select a false...
Experimental Result

● Phase 1-3
  – including Question Analysis and IR results for the combination run

● Average of the formal run for Phase 1-3: 35.3
  – Moderate

● Boosted up other system result in the combination run

<table>
<thead>
<tr>
<th>Phase</th>
<th>Team (Priority)</th>
<th>Score</th>
<th>Score of Combination run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase1 (Benesse)</td>
<td>Forst (2)</td>
<td>26</td>
<td><strong>35</strong></td>
</tr>
<tr>
<td>Phase3 (Center)</td>
<td>IMTKU (1)</td>
<td>12</td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

Results show effectiveness of our system
Discussion about Scoring

- Scoring
  - Made mistakes because of the different notation problem

<table>
<thead>
<tr>
<th>Choice Keywords</th>
<th>Match</th>
<th>Topic Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>ドレフュス事件 Dreyfus affair</td>
<td></td>
<td>ドレフュス事件 Dreyfus affair</td>
</tr>
<tr>
<td>ユダヤ系軍人 Jewish soldier</td>
<td></td>
<td>ユダヤ系フランス人将校 Jewish French officer</td>
</tr>
<tr>
<td>冤罪事件 false accusation case</td>
<td></td>
<td>機密漏洩冤罪事件 false charge case about secret leak</td>
</tr>
</tbody>
</table>
Discussion about True-or-False

● Conflict detection
  — Effective but the number of applicable questions was small

● Event detection
  — Not effective because of lack of information
  — We only considered too simple structure events
Summary

● KitAi-QA
  – Identify the question type by using keyphrase-based rules
  – Extract a related topic by scoring
  – Select an answer by using a related topic
    ✓ Conflict detection and event detection for True-or-False

● Result
  – Boosted up results of other systems