Introduction

- Our FRDC_QA team participated in the QA-Lab English subtask of the NTCIR-11. In this paper, we describe our system for solving real-world university entrance exam questions, which are related to world history. Wikipedia is used as the main external resource for our system.
- Since problems with choosing right/wrong sentence from multiple sentence choices account for about two-thirds of the total, we individually design a classification based model for solving this type of questions. For other types of questions, we also design some simple methods. Descriptions of methods, experimental results and conclusions are given in next sections.

Methods

### Framework for questions with multiple sentence choices

- **Item Relativity**
  - **Internal Item Relativity**
    - Item Relativity between Text and Choice
    - Similarity with Top 1 Related Wiki Article
    - Minimum Distance with Negative Sentences
    - Similarity with Top 3 Related Wiki Articles
  - **Number of Related Wiki Articles**

- **Features**

- **Classification models**
  - Logistic Model Trees
  - Random Forest
  - Naïve Bayes
  - Bagging
  - Locally Weighted Learning
  - MultiBoostAB
  - AdaBoost M1
  - Updateable Naïve Bayes

- Each classifier can get an accuracy probability for each choice, and the average value of the accuracy probability from all classifiers will be taken as the final accuracy probability of a choice.
- If the question is asking us to choose the right choice with the keywords 'correct', 'correctly' or 'appropriate', we choose the choice with highest accuracy probability as the final answer.
- If the question is asking us to choose the wrong choice with the keywords ‘incorrect’, ‘incorrectly’ or ‘mistake’, we choose the choice with lowest accuracy probability as the final answer.

### Frameworks for other types of questions

- **Questions with chronological sequence**
  - We utilize the ‘Lucene Index of Item Time’ to search timestamp of each event in the choices, and rank them with the chronological order, then we can choose the right answer according to this order easily.

- **Questions with Term Choices**
  - We detect items contained in background text and the question with Maximum Matching Method, then calculate the relativity and the choice item. Finally, the choice with highest relativity will be chosen.

- **Questions with judging true/false sentences**
  - We use the same features in above section to train SVM classification model to handle this type of questions by directly output the ‘true of false’ result of each choice instead of the accuracy probability.

- **Other types of questions**
  - We choose final answer with the random selection method for other types of questions, which need image analysis technology. In particular, we set a specified random seed to keep the stability of the results given by our system.

Results

<table>
<thead>
<tr>
<th>Types of questions</th>
<th>Number of correct answer / Total number</th>
<th>Score of correct answer / Total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 questions</td>
<td>10/23</td>
<td>28/62</td>
</tr>
<tr>
<td>Type 2 questions</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>Type 3 questions</td>
<td>3/7</td>
<td>9/20</td>
</tr>
<tr>
<td>Type 4 questions</td>
<td>0/0</td>
<td>0/0</td>
</tr>
<tr>
<td>Other questions</td>
<td>0/7</td>
<td>0/18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13/36</strong></td>
<td><strong>37/100</strong></td>
</tr>
</tbody>
</table>

Table 1. Evaluation results of our system in phase 1 English task

Future work

Several attempts can be tried to improve the system performance in our future work:
- more useful external resources can be utilized, such as query results from Google like search engines, etc.
- more reasonable and intelligent combination way for different classification models should be tried;
- different writing styles for timestamps, locations and personal names should be considered.

Furthermore, a unified domain insensitive system for choosing wrong/right answer from multiple sentence choice will be a trial in our future work.

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