A method for GeoTime information retrieval based on question decomposition and question answering
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Abstract
In this paper, we report the evaluation results of our GeoTime information retrieval system at NTCIR-8 GeoTime. We participated in the Japanese mono-lingual task (JA-JA). Our proposed method for GeoTime information retrieval is based on question decomposition and question answering. We demonstrated that the proposed method is able to accept GeoTime questions and retrieve relevant documents to some extent. However, there is still room to improve the effectiveness of retrieval. In per-topic evaluation results, we can find there are some text processing methods that cannot be appropriately handled by our method, and therefore the method lacks in robustness in terms of variety of GeoTime questions.

Introduction

● We participated in the Japanese mono-lingual (JA-JA) task.
● Our proposed method for GeoTime information retrieval is based on
  – Question decomposition
  – Question answering.

GeoTime information retrieval can be regarded as a special case of IR4QA, because a query submitted to a system is a natural language question in typical situations. We may straightforwardly consider documents that have good answer candidates as documents relevant to the query.

Proposed Method

GeoTime question

| When | Where | In interrogative
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Article</td>
<td>Sentence</td>
<td>Score</td>
</tr>
<tr>
<td>ACi</td>
<td>Si</td>
<td>Sj</td>
</tr>
</tbody>
</table>

Example GeoTime question (GeoTime-0003)

1. どこで、ポール・ニッツは、亡くなりましたか？
   - [When and where did Paul Nitze die?]
2. どこで、ポール・ニッツは、亡くなりましたか？
   - [When and where did Paul Nitze die?]
3. ポール・ニッツは、亡くなりましたか？
   - [When and where did Paul Nitze die?]
4. ポール・ニッツは、亡くなりましたか？
   - [When and where did Paul Nitze die?]

Our current implementation of question decomposition is based on a simple pattern-match.

Facetoid Question Answering System

● It is difficult to make QA systems high precision with one monolithic method.
   - There is a trade-off relation between informationfulness and robustness of analysis in each processing technique.
   - More informative  More robust
   - We employ multiple complementary methods in order for our QA system to have a variety of informationfulness and robustness.

Experimental Results and Discussion

● We conducted four runs shown in Table 3.
  - The difference among the runs is due to:
    - Scoring strategy
    - Parameter settings of the question-answering system

Table 4: Mean of each evaluation metrics

<table>
<thead>
<tr>
<th>Run ID</th>
<th>mean Q®</th>
<th>mean dACG®</th>
<th>mean nDCG®</th>
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</thead>
<tbody>
<tr>
<td>FORST-JA-JA-01-D</td>
<td>0.283</td>
<td>0.209</td>
<td>0.322</td>
</tr>
<tr>
<td>FORST-JA-JA-02-D</td>
<td>0.286</td>
<td>0.209</td>
<td>0.322</td>
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<tr>
<td>FORST-JA-JA-03-D</td>
<td>0.206</td>
<td>0.238</td>
<td>0.324</td>
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<tr>
<td>FORST-JA-JA-04-D</td>
<td>0.276</td>
<td>0.287</td>
<td>0.377</td>
</tr>
</tbody>
</table>

Table 3: Description of system parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scoring strategy</td>
<td>Strategy 1, Strategy 2, Strategy 3, Strategy 4</td>
</tr>
<tr>
<td>Parameter settings</td>
<td></td>
</tr>
</tbody>
</table>

| Table 5: Comparison between the question-answering system
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy 1</td>
<td>Strategy 2</td>
</tr>
<tr>
<td>Raw score</td>
<td>Weighted score</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>[Formula 1]</td>
<td>[Formula 2]</td>
</tr>
</tbody>
</table>

Related work

● GeoTime information retrieval may be regarded as a special case of IR4QA.
   - Many approaches to IR4QA introduce some extensions to treat natural sentence questions or question types.
   - Their foundation are information retrieval systems

- [Clarke 01, Xu 03]
- [Sakai et al. 2008]
- [Takamura et al. 2006]
- [Sakai et al. 2008]

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