Implementing Search Engine Knowledge Cards
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Introduction
- Web search engines have been the most common source of online knowledge. Every query entered by a user is transformed in a structured form, which is known as the knowledge card.
- These cards describe attributes of the entity queried to the search engine and also the relationship with different related entities. Different search engines like Google and Bing transform the query into knowledge cards.
- These cards from different engines can be fused up, if compatible to get a much better comprehensive view about the queried entity.

Background
- Previous research has been done on the topic 'Effective Online Knowledge Graph Fusion' which discusses on the fly data online fusion based on the query entered by the user.
- Above paper discussed the overall workflow of the approaches used to fuse knowledge cards online. They explained the efforts required to fuse knowledge cards automatically from different search engines using knowledge card extractor.
- Once cards extracted, card disambiguation, property alignment and value deduplication formulas were implemented.

Objective
- Fusing up the knowledge cards created by search engines like Google and Microsoft Bing and create a new integrated response to get a much better comprehensive view about the entity.

Implementation
- Retrieving Knowledge cards automatically from Google Search Engine
- Knowledge cards automatic retrieval from Bing Search Engine
- Implementing Commonness Formulas using Wikipedia’s retrieved data.
- Relatedness Formula implementation using DBpedia API’s retrieved data.
- Implementing Property Alignment rules and its related formulas.

Results
- **Step 1:** Knowledge Card of Microsoft Bing and Google retrieval using http REST Api’s.
- **Step 2:** Implementing Commonness and Relatedness Formula and comparing the results from paper[1].
  - Commonness: This score measures the strength ‘m’ links to an Wikipedia entity ‘e’
  - Relatedness: This score is used to measure the closeness of entity ‘e’ to its object value.

Experiment Results

<table>
<thead>
<tr>
<th>Entity</th>
<th>Commonness</th>
<th>Relatedness</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon</td>
<td>0.8</td>
<td>0.71</td>
<td>0.74</td>
</tr>
<tr>
<td>Apple</td>
<td>0.35</td>
<td>0.85</td>
<td>0.68</td>
</tr>
<tr>
<td>New York Times</td>
<td>0.52</td>
<td>0.44</td>
<td>0.38</td>
</tr>
<tr>
<td>RIT</td>
<td>0.95</td>
<td>0.77</td>
<td>0.8</td>
</tr>
<tr>
<td>Uber</td>
<td>0.50</td>
<td>0.37</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Future Work
- Implement Property Alignment formulas and comparing them with the results achieved from the paper[1].
- Implement Value deduplication and compare achieved results with the paper results[1].
- Create User Interface to show integrated response for any entity in JSON format.

Conclusion
- Knowledge cards of search engine like Google and Bing were retrieved using REST API’s.
- Wikipedia results were retrieved in Json format to get the closest and most related result to be retrieved by Google and Bing. Attribute value properties were also retrieved using DBpedia API’s and implemented formulas resulted were compared with the paper[1] results.

References
- [1] Haofen Wang, Zhija Fang, Le Zhang, JeffZ. Pan and Tong Raun. Effective Online Knowledge Graph Fusion. East China University of Science and Technology, China and University of Aberdeen, UK