Reasoning over Knowledge Graph for Recommendation

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Background
- Knowledge base provides deep knowledge on items and logical connections among other entities.

- We construct a recommendation knowledge graph that consists of the user-item interactions and additional knowledge graph.

- Promising applications
  - Knowledge-aware recommender systems exhibit reasons behind a recommendation.
  - Using knowledge achieves high recommendation quality and extends user interests.

Experimental results

>> Dataset Statistics
- MovieLens
- GoodBook
- Open knowledge base: WikiData

<table>
<thead>
<tr>
<th>Recommender System</th>
<th>Knowledge Graph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dataset</td>
<td>#users</td>
</tr>
<tr>
<td>MovieLens</td>
<td>13948</td>
</tr>
<tr>
<td>GoodBook</td>
<td>11947</td>
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</tbody>
</table>

>> Movie Recommendation

- u1 has interest in item 5 because:
  - she likes the <actor: Martin Freeman>, score: 0.97
  - she likes the <director: Toby Haynes>, score: 0.67

Knowledge-aware Recommendation
- We first employ a random walk to extract the paths connecting the user and the target item (i.e., reasons) from the recommendation knowledge graph.

- We next design an embedding model that can generate representations for each path and reweight the paths based on their importance.