Let Me Know What to Ask: Interrogative Word-Aware Question Generation

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Introduction

- Two important aspects for Question Generation:
  - Interrogative word (i.e., wh-word)
  - Vocabulary & grammar
- The interrogative word is a key component in a question
- Previous models learn to generate both interrogative word and the rest of the question simultaneously
- We propose a method that separates the two tasks to generate more accurate interrogative words

Experimental Settings

- Dataset: SQuAD v1.1
  - In the same way as the baselines, the dev set is split randomly into dev and test set with ratio 50%-50%
- Metrics: essentially compute the n-gram similarity between the generated question and the reference question
  - BLEU: precision-based evaluation
  - METEOR: precision & recall-based evaluation
  - ROUGE: recall-based evaluation

Comparison with Baselines

- To demonstrate an independent interrogative-word classifier leads to a better performance

<table>
<thead>
<tr>
<th>Model</th>
<th>BLEU-1</th>
<th>BLEU-2</th>
<th>BLEU-3</th>
<th>BLEU-4</th>
<th>METEOR</th>
<th>ROUGE-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zhou et al. (2017)</td>
<td>-</td>
<td>-</td>
<td>13.29</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Zhao et al. (2018)*</td>
<td>45.69</td>
<td>29.58</td>
<td>22.16</td>
<td>16.85</td>
<td>20.62</td>
<td>44.99</td>
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<tr>
<td>Kim et al. (2019)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16.17</td>
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<tr>
<td>Liu et al. (2019)</td>
<td>46.58</td>
<td>30.90</td>
<td>22.82</td>
<td>17.55</td>
<td>21.24</td>
<td>44.53</td>
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<tr>
<td>IWAcQ</td>
<td>47.69</td>
<td>32.24</td>
<td>24.01</td>
<td>18.53</td>
<td>22.33</td>
<td>46.94</td>
</tr>
</tbody>
</table>

* our GS module (Only QG)

Conclusion and Future Work

Conclusion

- Our approach predicts first an interrogative word, and then generates a question conditioned on the predicted interrogative word
- An independent Interrogative-word classifier helps identifying the correct interrogative word for a question
- The proposed pipeline approach outperforms the previous models
- Based on our method, other modules can be used to improve the overall performance

Future Work

- Testing our approach on other datasets to prove its generalization capability
- Utilizing a GG model to improve Question Answering systems

Recall of Interrogative Words

- To prove the pipelined approach can predict better interrogative words

Upper Bound Analysis

- To show the performance can be improved with better interrogative-word classifiers

<table>
<thead>
<tr>
<th></th>
<th>Accuracy</th>
<th>BLEU-1</th>
<th>BLEU-2</th>
<th>BLEU-3</th>
<th>BLEU-4</th>
<th>METEOR</th>
<th>ROUGE-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only QG*</td>
<td>45.63</td>
<td>30.43</td>
<td>22.51</td>
<td>17.30</td>
<td>21.06</td>
<td>45.42</td>
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<tr>
<td>IWAcQ (73.8%)</td>
<td>47.69</td>
<td>32.24</td>
<td>24.01</td>
<td>18.53</td>
<td>22.33</td>
<td>46.94</td>
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<tr>
<td>Upper Bound (100%)</td>
<td>50.51</td>
<td>34.28</td>
<td>25.60</td>
<td>19.75</td>
<td>23.45</td>
<td>49.65</td>
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