Yes/No Question Answering

- In order to know whether a claim is true or false given a context, one way is to ask a Yes/No question.

Jane, who is a native of Los Angeles, married a lawyer from NYC.

- Clark et al., (2019) proposed the Yes/No QA task and released the BoolQ dataset that includes paragraphs together with naturally occurring questions whose answer is either “Yes” or “No”.

<table>
<thead>
<tr>
<th>Did Jane marry a lawyer?</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was Jane born in France?</td>
<td>No</td>
</tr>
</tbody>
</table>
Yes/No Question Answering

- However, in practical situations, we do not always have the information required to answer the question.
- In these cases, we expect the system to answer “IDK”.

Jane, who is a native of Los Angeles, married a lawyer from NYC.

- Did Jane marry a lawyer? Yes
- Was Jane born in France? No
- Did Jane marry in NYC? IDK
In this work

1. Towards a More Natural Task:
   - Augmenting BoolQ with unanswerable questions
   - Compiling out-of-domain test sets

2. Difficulty of the New Task:
   - Only training on the task-specific data
   - Leveraging other Natural Language Understanding tasks
Augmenting BoolQ with IDK

- Sampling randomly half of the “Yes” questions and half of the “No” questions

- Matching to each of the extracted questions a passage from BoolQ that has the greatest overlapping with the questions in terms of nouns and verbs.

- We apply this process on both training and dev sets.
Example:

**Question:** Do they make a new Lombardi Trophy every year?

**Context:** The Vince Lombardi Trophy is the trophy awarded each year to the winning team of the National Football League’s championship game, the Super Bowl. The trophy is named in honor of NFL coach Vince Lombardi.

**Answer:** IDK
Augmenting BoolQ with IDK

- We obtain new IDK questions (4.7k for train and 1.6k for dev) that we add to the original sets. It represents 33% of the new corpora.

- We call the new corpus $\text{BoolQ}_{3L}$ (for BoolQ with three labels).

- Validation:
  - A sample of 200 sentences, 100 from the train set, and 100 from the dev set, validated by two of the authors of the paper: Is the annotation correct? (i.e. Is there an answer?)

  Results:
  - 94%/ 93% for train (97% absolute inter-annotator agreement)
  - 95% for dev (100% absolute inter-annotator agreement)
New Event-Based Corpora

- Compiling a test event corpus for yes/no-questions - ACE-YNQA, derived from ACE, focusing on time and location (999 Examples)

- Has-answer:
  “The world bank offered a loan in 1999.”
  Did the offer happen in 1999?

- IDK:
  “The world bank offered a loan in 1999.”
  Has the loan been paid?
New Instruction-Based Corpora

- Compiling a small Yes/No INSTRUCTIONS corpus (70 examples)

- Has-answer:
  “Multiply columns B and C.”
  Should a math operation be performed?

- IDK:
  “Change the font color to green.”
  Is the font size 12?
The Difficulty of the New Task

<table>
<thead>
<tr>
<th></th>
<th>Textual Entailment</th>
<th>Binary Textual Entailment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BoolQ&lt;sub&gt;3L&lt;/sub&gt; dev</strong></td>
<td>33.64</td>
<td>43.25</td>
</tr>
<tr>
<td>ACE-YNQA</td>
<td>52.02</td>
<td>54.94</td>
</tr>
<tr>
<td>INSTRUCTIONS</td>
<td>26.56</td>
<td>20.31</td>
</tr>
</tbody>
</table>

**3 LABELS:** Accuracy of a BERT-LARGE based system trained on BoolQ<sub>3L</sub>

<table>
<thead>
<tr>
<th></th>
<th>BoolQ</th>
<th>MNLI+BoolQ</th>
<th>c(MNLI)+BoolQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>BoolQ dev</td>
<td>72.88</td>
<td>78.24</td>
<td>79.49</td>
</tr>
<tr>
<td>ACE-YNQA&lt;sub&gt;Y/N&lt;/sub&gt;</td>
<td>59.53</td>
<td>65.47</td>
<td>68.01</td>
</tr>
<tr>
<td>INSTRUCTIONS&lt;sub&gt;Y/N&lt;/sub&gt;</td>
<td>65.00</td>
<td>70.00</td>
<td>65.00</td>
</tr>
</tbody>
</table>

**2 LABELS:** Accuracy of a BERT-LARGE based system trained on BoolQ
Conclusion

- In order to use Yes/No QA in realistic scenarios, the ability to answer IDK is necessary.

- We extend the existing Yes/No QA benchmark:
  - Augmenting BoolQ with unanswerable questions
  - Compiling out-of-domain test sets, including a Yes/No QA test set related to event extraction.

- We show the considerable difficulty of 3-label Yes/No QA compared to the 2-label setting.
Thank you for listening
The data, code and pre-trained models can be found at
http://cogcomp.org/page/publication_view/955

Jane, who is a native of Los Angeles, married a lawyer from NYC.

- Did Jane marry a lawyer? Yes
- Was Jane born in France? No
- Did Jane marry in NYC? IDK

eliors@seas.upenn.edu
https://www.cis.upenn.edu/~eliors/