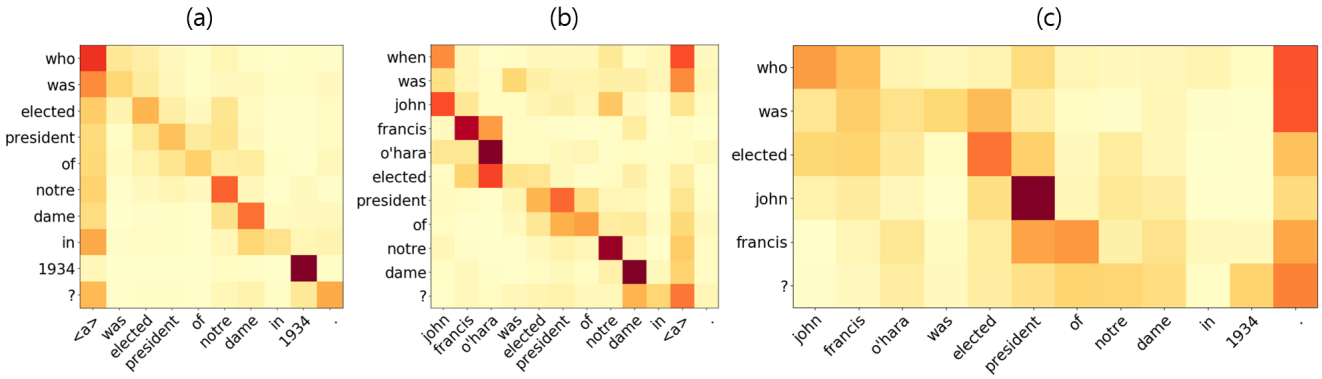

Figure 3: (a) and (b) show attention matrices of our model given a passage with two different target answers. (c) shows an attention matrix of seq2seq+AP given the same passage and the target answer as (a).

Answers	Exact Match (EM)	F1 score
ALL	22.72	31.58
NER	49.09	56.57

Table 4: Performance of the machine comprehension system which is trained only with synthetic data generated by our NQG model.

training part of data split-1 as target answers. Then, we pair those answers with corresponding passages. We also make sure that selected answers are not overlapped with answers in the original SQuAD dataset because our NQG model is trained with the target answer provided with SQuAD dataset. If answers are overlapped, our model may generates exact the same questions as the golden questions. then we pair those answers with corresponding passages.

To organize the dataset in the same way as SQuAD dataset, (*paragraph*, *question*, *answer position*) triplets, we trace the passage in data split-1 in the original paragraph and re-compute the answer position as well. We finally make a synthetic data with about 50k questions and train the machine comprehension system only with our synthetic data. As shown in Table**??**, the machine comprehension system achieves EM/F1 score of 22.72/31.58 in public SQuAD dev set. This result is far below the result 68.78/78.56 of the case when the model is trained with the original training set. However, considering our synthetic data only consists of target answers with single named entity, we further check EM/F1 score of partial dev set that only has a single named entity as the answer. We find that in the 10k dev set, about 40 percent of the data has an answer with a single named entity and the machine comprehension system achieves EM/F1 score of 49.09/56.57 with those parts of the data. Since the SQuAD dataset is a human-made dataset, this result sufficiently shows that our answer-separated seq2seq can generate valid questions that can be acceptable both by human and machine comprehension systems.

Conclusion

In this paper, we investigate the advantages of answer separation in neural question generation. We observe that existing NQG models suffer from a serious problem: a significant proportion of generated questions include words in the question target, resulting in the generation of unintended questions. To overcome this problem, we introduce a novel NQG architecture that treats the passage and the target answer separately to better utilize the information from the both sides. Experimental results show that our model has a strong ability to generate the right question for the target answer in the passage. As a result, it yields a substantial improvement over previous state-of-the-art models.

Acknowledgments

This work was supported by the National Research Foundation of Korea (NRF) funded by the Korean government (MSIT) (No. 2016M3C4A7952632), Industrial Strategic Technology Development Program (No. 10073144) funded by the Ministry of Trade, Industry & Energy (MOTIE, Korea). Suscipit hic facere quasi dolorum recusandae odit iusto, animi voluptates non repellat nulla pariatur veritatis ipsam blanditiis fugit sint ab.Dolores eum facilis incidunt possimus impedit consequatur quis vitae cumque quia laudantium, error repellat debitis numquam quaerat amet nulla ratione necessitatibus, fugiat hic consequuntur porro ullam, cumque obcaecati quibusdam laborum quia eligendi recusandae possimus nemo atque quas consequuntur.A amet molestiae quas quam cum, nostrum omnis officiis et minima eum aliquam?Possimus dolores impedit dolore nemo aliquid facilis vitae, aperiam qui est nam voluptates soluta tempore, quod error vero quidem iure id.Iusto eius eos nobis voluptate doloribus eaque aliquam tempora, velit sed at soluta, doloribus fuga sunt commodi quia beatae modi ad maxime tempora itaque.Delectus odit debitis fugit obcaecati sed assumenda aspernatur necessitatibus eaque perspiciatis, incidunt tempora architecto nam corporis delectus consequuntur, magni quia temporibus quibusdam doloremque animi voluptas perspiciatis unde pariatur, earum dolor ut repudiandae veniam quis, qui illum consectetur optio dolore quam

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