Draft for NLP Project Proposal

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Abstract. In this draft, I would propose two interesting tasks in NLP where we could potentially apply Reinforcement Learning method. The first is *abstractive summarisation* and the other is *sentiment analysis*.

Keywords: Reinforcement Learning

1 Research Background

Okay to be honest I was mainly doing task-oriented literature review until I read the draft proposed by SongYan where he suggest the Reinforcement Learning (RL) in NLP. To gain an overview of how RL is being applied to NLP tasks, here is a helpful reference by Stanford. Fig 1 shows some potential fields.

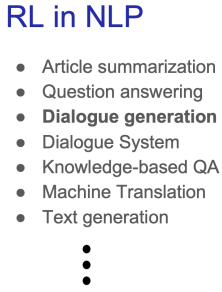

Fig. 1. Application of RL in NLP tasks

I would first propose to look at the task - **article summarisation**. Article summarisation has two research topics, one is text summarisation and the other is abstractive summarisation, which will be the main focus here. Simply put, the difference between the two is that astractive summarisation allows us to use

word/term outside the scope of the text/document being summarised, so is with more flexibility when applied in industry practice.

Another task worth receiving attention is **sentiment analysis** (everyone likes sentiment analysis!). But her ewe would like to use Reinforcement Learning combined with Supervised Learning techniques to accomplish it. There are not yet many papers about applying RL in sentiment analysis. Here is one interesting idea proposed in OpenAI meeting. The author consider really basic Policy Gradient method so I believe there are many possibilities to modify it or to apply similar method to other dataset. Another variant is doing Multimodal Sentiment Analysis (using Computer Vision, NLP) with RL, this is a quite recent paper.

2 Abstractive Summarisation

Now let's review some relevant paper and find some potential pitfalls. First, most of the relevant research use either **CNN/Daily Mail** or **New York Times** datasets which provide us with original corpus and their summaries. Second, by far the state-of-the-art methods are sequence-to-sequence modeling but more attempts are being made with RL. Say this one by Salesforce Research. Other papers are Yaser et al, 2019 and Siyao et al, 2019.

Until this point I am not sure if we are capable of improving the method but since this field is new and not yet many papers, and also Tim is probably familiar with this field, we might be able to do that haha.

If we dont want to improve the methods, the other way of carrying out the research is to test those existing methods above to new dataset related to abstractive summarisation. There are many critics about the typical new article dataset because they have a similar style of writing (the way journalists love) so the data itself might be biased. By far we have two new dataset, one is the **WikiHow** data (2018) suggested by Tim, the other is **BIGPATENT** data (2019). These dataset are just too new to have been tested yet, so we could create some baseline and see whether those existing methods would work well on them.

3 Sentiment Analysis

I have not yet come up with a very interesting data to test upon by RL methods.

4 Behind the Scene

The reason why I choose this field is 1) Three of us is learning Reinforcement Learning now lol 2) RL in NLP is indeed an emerging research field and the RL techniques adopted in the NLP method is not that fancy and very basic, meaning we have already encountered in the RL lecture (whether we are really following the lectures is another story tho) So it might be easier for us to create variants. 3) Tim have wrote that survey paper about RL in NLP (see SongYan's proposal), so we might get help from him.