Self-Attention Sentimental Sentence Embedding For Sentiment Analysis

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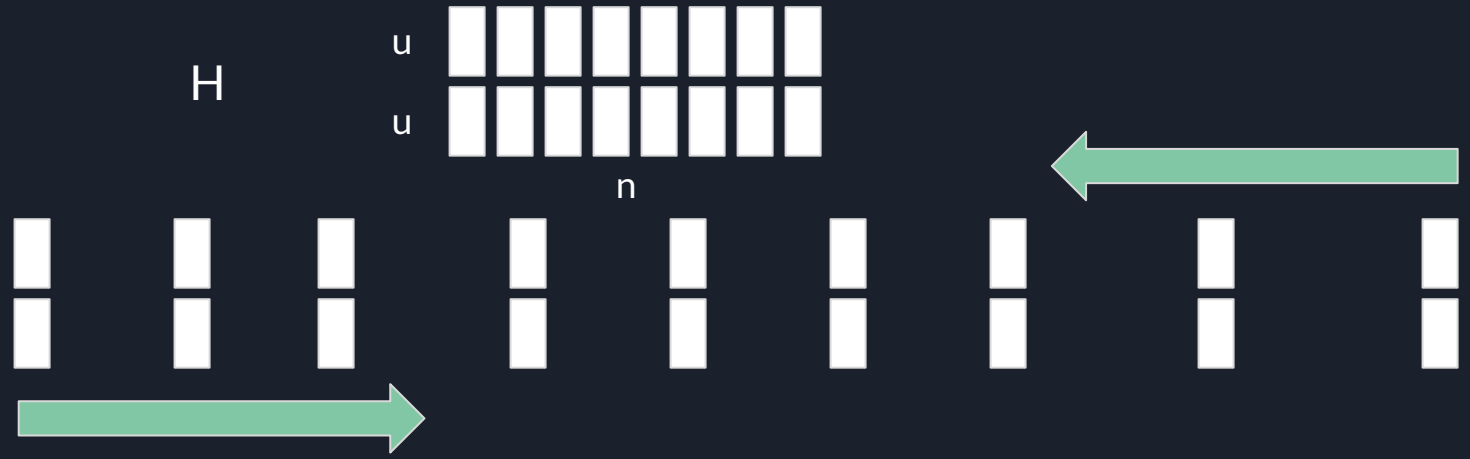
Outline

- Introduction
- Methodology
- Experiments
  - Datasets
  - Results
- Conclusion

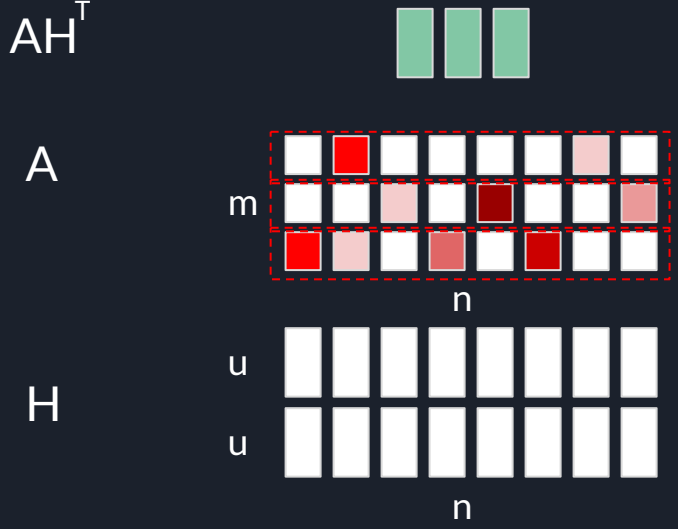
Introduction

- Pre-trained word embedding has shown success in NLP
- Some fields, such as Finance, have very few labeled data and many domain specific words, which make the field-related NLP tasks more challenging.
- There are many domain specific dictionaries; can we integrate the human knowledge into NLP tasks ?
- Yes. In this paper, we integrate dictionary into a self-attention model for sentiment analysis

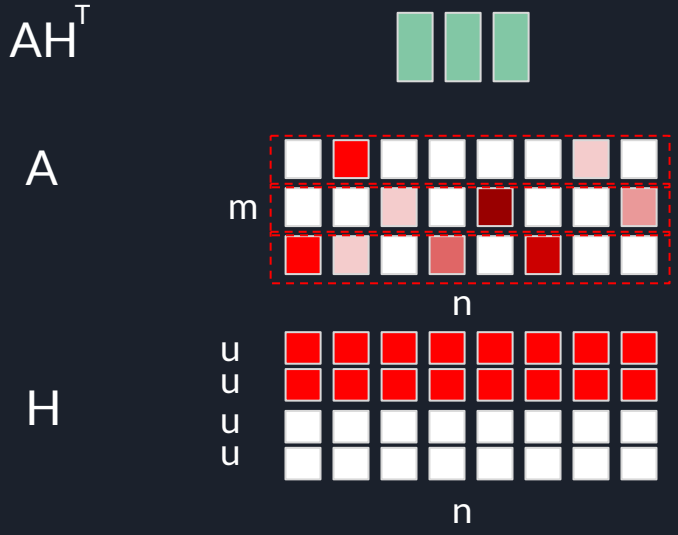
Our Methodology - Self Attention



Our Methodology - Self Attention



Our Methodology - Self Attention + Sentiment



Sentiment categories
N: negative
L: litigious
O: others

Sentiment	N	O	O	O	O	L	O	L	O
Word	Failure	to	comply	with	any	laws	and	regulations	that

Experiment

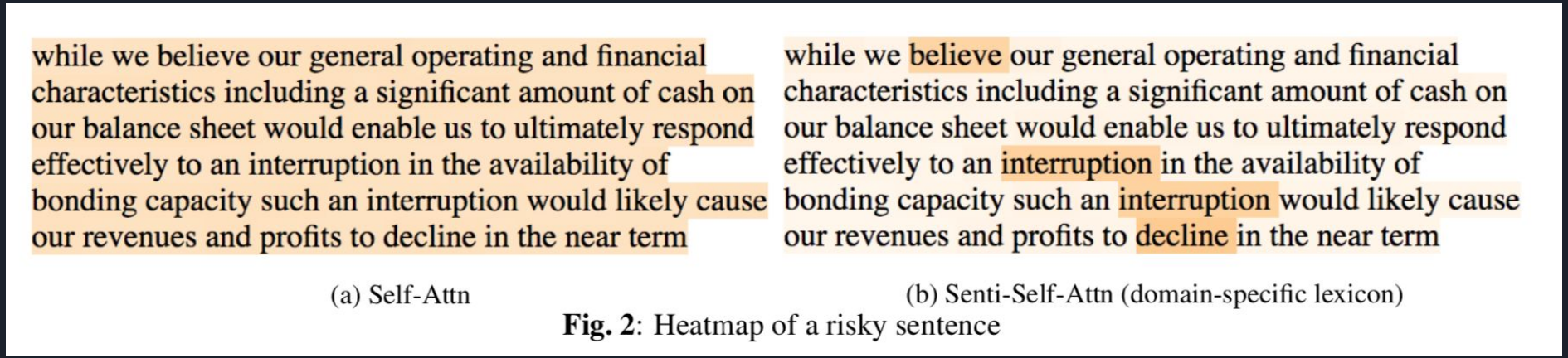
- Datasets
  - 10K-Sentence (Label: Risky / Non-risky)
  - Yelp (Polarity 2-way, Full 5-way)
  - Amazon (Polarity 2-way, Full 5-way)
- Dictionary
  - General dictionary
  - Domain specific dictionary

Experiment

Accuracy	Dictionary	10K-Sentence Full (2-class)	Yelp Polarity (2-class)	Yelp Full (5-class)	Amazon Polarity (2-class)	Amazon Full (5-class)
BOW		87.86%	90.41%	46.50%	86.31%	41.00%
LSTM		85.40%	91.10%	52.40%	89.10%	51.70%
CNN		85.37%	87.22%	58.78%	83.02%	51.36%
fastText		87.00%	92.40%	58.10%	89.10%	52.10%
Self-Attn		85.80%	94.41%	62.38%	91.77%	**56.63%**
Senti-Self-Attn	General-purpose	87.24%	**94.66%**	**62.95%**	91.78%	56.25%
Senti-Self-Attn	Domain-specific	**88.13%**	94.23%	62.07%	**91.83%**	55.58%

Table 1: Performance comparison

Case Study



(a) Self-Attn (b) Senti-Self-Attn (domain-specific lexicon)

Fig. 2: Heatmap of a risky sentence

Conclusion

- Demonstrate how to incorporate human knowledge, such as dictionary, into machine learning models.
- The empirical results show the effectiveness of our proposed model, especially for finance specific dataset.
- The attention heat map analysis shows how dictionary facilitates model to learn domain specific words.