



WUST at the NTCIR-14 STC-3 Dialogue Quality and Nugget Detection Subtask

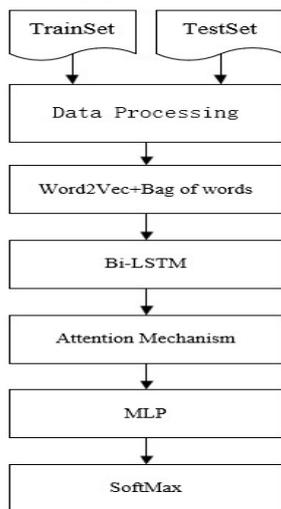
Ming Yan, Maofu Liu, Junyi Xiang

School of Computer Science and Technology, Wuhan University of Science and Technology, Wuhan 430065, China
liumaofu@wust.edu.cn

Introduction

- ◆ Dialogue quality aims to build an evaluation system to evaluate a task-oriented, multi-round, text-based dialogue system.
- ◆ Nugget detection aims to extract the state of each sentence from multiple dialogues.
- ◆ The existing evaluation systems are limited to the specific domains, which are difficult to apply to the other domain universally.
- ◆ We adopt Bi-LSTM and attention mechanism to obtain the semantics of different parts of the conversation to achieve the dialogue quality and nugget detection for task-oriented dialogue.

System Architecture



1. Data Preprocessing

- ◆ First, we choose Jieba Chinese word segmenter to segment the Chinese word.
- ◆ Second, the stop words will cause noise interference to the effective information of the text, and the deactivation words have no special meaning. In order to reduce the noise interference caused by deactivation words to the sentences, first remove the stop words before extracting the features of the text.

2. Model

- ◆ First, we add the word vectors after word segmentation to sentence vectors.
- ◆ Second, we adopt Bi-LSTM to decode sentence vectors, he information of "past" and "future" of the text can be retained at the same time. In this paper, we use three layers of Bi-LSTM to overlay, so that we can fully learn the semantic information and context dependency between dialogues.
- ◆ Third, the attention mechanism is a model that simulates the attention of the human brain. In the field of natural language processing, the model is mainly used to express the correlation between words in text sentences and output

results. So we can extract important information and selectively ignore useless information. The specific formula is shown in formula (1-3).

$$u_t = \tanh(W_w h_t + b_w) \quad (1)$$

$$\alpha_t = \frac{\exp(u_t^T u_w)}{\sum_t \exp(u_t^T u_w)} \quad (2)$$

$$V = \sum_t \alpha_t h_t \quad (3)$$

- ◆ Finally, we adopt a full connection layer to get the classification results, and then use SoftMax to get the probability of the classification results.

Experiments

- ◆ The official evaluation results are listed in Table 1-4.

Run	Mean RSNOD	Run	Mean NMD
WUST-run0	0.1251	WUST-run0	0.0836
WUST-run1	0.1274	WUST-run1	0.0860
WUST-run2	0.1263	WUST-run2	0.0845

Table1. The results of A-score in dialogue quality

Run	Mean RSNOD	Run	Mean NMD
WUST-run0	0.1226	WUST-run0	0.0779
WUST-run1	0.1270	WUST-run1	0.0808
WUST-run2	0.1248	WUST-run2	0.0779

Table2. The result of S-score in dialogue quality.

Run	Mean RSNOD	Run	Mean NMD
WUST-run0	0.1200	WUST-run0	0.0780
WUST-run1	0.1236	WUST-run1	0.0828
WUST-run2	0.1167	WUST-run2	0.0774

Table3. The result of E-score in dialogue quality.

Run	Mean JSD	Run	Mean RNSS
WUST-run0	0.0223	WUST-run0	0.0909
WUST-run1	0.0233	WUST-run1	0.0931
WUST-run2	0.0250	WUST-run2	0.0980

Table4. The result of nugget detection.

We submitted three results of our system for STC task in Chinese by Bi-LSTM and attention mechanism method.

- ◆ Bi-LSTM can get the context dependence in the dialogue very well, so it can judge the degree of completion of the dialogue. Attention can catch the information of thanks (“感谢”) and thank you (“谢谢你”) from the dialogue customers, and can judge whether the dialogue is effective or not and the satisfaction of the customers in the dialogue.

Conclusions

- ◆ This paper proposes a neural network method, which uses Bi-LSTM to extract the context dependency between dialogues, and adopts attention mechanism to learn the key sentences or phrases in the dialogue, and combines these two kinds of information to improve the dialogue quality and the identification of nugget detection ability.
- ◆ In the future, we can adopt multi-hop attention mechanism to learn the key sentences or phrases in the dialogue, and combines these two kinds of information to improve the dialogue quality and the identification of nugget detection ability.