Bidirectional Machine Reading Comprehension for Aspect Sentiment Triplet Extraction

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Aspect sentiment triplet extraction task (ASTE)

Three challenges:
- How to adequately learn the association between aspect term extraction (ATE) and opinion term extraction (OTE) and make them mutually beneficial.
- How to flexibly and exactly detect the complicated relations between aspects and opinion expressions.
- How to properly introduce the detected relations into sentiment classification task.

Model

- Transform ASTE task into a multi-turn machine reading comprehension (MTMRC) task.
- Propose a bidirectional MRC (BMRC) framework.

Three types of queries:
- Non-restrictive extraction query $Q^N = \{q_i^N\}_{i=1}^N$, Restrictive extraction query $Q^R = \{q_i^R\}_{i=1}^R$, Sentiment classification query $Q^S = \{q_i^S\}_{i=1}^S$.

Encoding Layer: BERT

Answer Prediction:
- For extraction query: $p(y_i|\Delta P, q) = \text{softmax}(h_{q|\Delta P+1} W_q)$, $p(y_i|\Delta P, q) = \text{softmax}(h_{q|\Delta P+1} W_q)$
- For sentiment classification query: $p(y_i|\Delta P, q) = \text{softmax}(h_i W_c)$

Joint Learning: minimize the cross-entropy loss.

Inference: fuse the answers to different queries and obtain triplets.

Experiments

Experimental results (%). 'A-S', 'O', 'P' and 'T' denote aspect term and sentiment co-extraction, opinion term extraction, aspect-opinion pair extraction, and aspect sentiment triplet extraction.

Ablation study on sentiment classification (F1-score, %).

Ablation study on aspect sentiment triplet extraction (F1-score, %).

Ablation study on the restrictive extraction query and the bidirectional structure.

The result of aspect sentiment triplet extraction (ASTE): (food, delicious, positive) [price, expensive, negative].

The food was delicious, but the price was indeed expensive.

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