

1. Reasoning Implicit Sentiment with Chain-of-Thought Prompting



Reasoning Implicit Sentiment with Chain-of-Thought Prompting

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https://aclanthology.org/2023.acl-short.101

Abstract

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About Paper

1.Background & Problems

Explicit Sentiment Analysis (ESA) \rightarrow the emotional expressions explicitly occur in texts. Implict Sentiment Analysis (ISA) \rightarrow thw inputs contain only factual description with no explict opion expression directly given.

Without understanding how the sentiment is aroused, traditional SA methods are ineffective to ISA.

2.Method

Introduce a **Three- hop Reasoning (THOR)** CoT framework to mimic the human-like reasoning process for ISA.

This paper consider mining the implict aspect and opinion states → common-sense reasoning and multi-hop reasoning

Design a three-step prompting principle for THOR to step-by-step induce the im- plicit aspect, opinion, and finally the sentiment polarity.

3.Conlusion

Present a THOR prompting framework to achieve the CoT reasoning process for implict sentiment analysys.

Design three prompt for three steps of reasoning: 1. fine-grained aspect; 2. underlying opinion; 3. final polarity.

Show that the larger LLMs, the more significant improvement by THOR method.

4.Limitations

While on the middle or lower size LLMs, the improvement by THOR will be limited to certain extent, due to the emergence nature of LLMs.

Analyze Paper

- CoT + LLM → Implict Sentiment Analysis
- Creativity: 融合创新

My Thoughts

• CoT + LLM + PEFT → Sentiment Analysis

Pictures

Figure 1: Detecting the explicit and implicit sentiment polarities towards targets. Explicit opinion expression helps direct inference, while detecting implicit senti- ment requires common-sense and multi-hop reasoning.

Explicit Sentiment

Case#1: The environment of the hotel is so great! positive

Commonsense, reasoning Reasoning the underlying intent/context

Tandoori salmon is a dish made with salmon.

By saying this, the speaker is recommending the tandoori salmon, mostly because he or she believes the taste of tandoori salmon is good and worth trying. Thus the polarity of

Multi-hop reasoning

• Implicit Sentiment

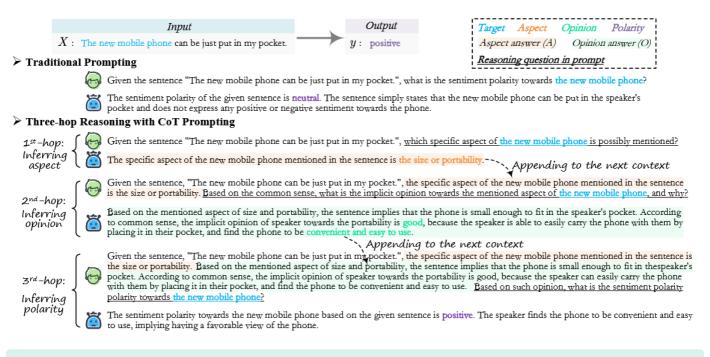
Case#2: Try the tandoori salmon!

tandoori salmon is positive.



positive

Figure 2: An illustration of our THOR framework for three-hop reasoning of implicit sentiment



Note

Reasoning Implicit Sentiment with Chain-of-Thought Kompting

read date: 2023.12.3

Conclusion: present a THOR prompting framework to achieve the CoT reasoning process for implicit sentiment analysis.

design three prompts for three steps of reasoning:

1° fine-gained aspect 2° underlying opinion 3° final polarity show that the larger LLMs, the mose significant improvement by THOR method.

Limitations: while on the middle of lower size of LLMs, the improvement by THOR will be limited to certain extent, due to the emergence norture of LLMs.

the architecture of this paper:

Introduction, Three-hop Reasoning Framwork

Experiments, Related Work. Conclusion.

CoT prompting

- Enhancing Rousoning via Self-consistency Reasoning Revising with Supervision

Limitation ..

Introduction

a explicit SA (ESA) → the emotional expressions explicitly occur in texts. Somtiment Analysis (SA) >> implicit SA (ISA) -> the inputs contain only factual descriptions with no explicit opinion expression directly given.

without understanding how the sentiment is avoused, thaditional SA methods are inffective to ISA.

/lommon-sense reasoning this paper consider mining the impliet aspect and opinion states => multi-hop reasoning

LLMs showing extraordinary ability on common-sonse reasoning the CoT ideas has revealed the great potential of LM's multi-hop reasoning.

this paper design 3 prompts for three steps of reasoning, each of which respectively infers: 1° the fine-grained aspect of the given target.

2 the underlying opinion towards the aspect

3° the final polarity.

this is the first attempt to successfully extend the CoT idea to the sentiment analysis community. It can brassly applied to other similar NLP problems without much effort.

Three-hop Rousoning Framework

Cot Fromptions: 1st-hop: inferring aspect

2nd-hop: inferring opinion

THOR framework for three-hop reasoning

3nd-hop: inferring polarity of implict sentiment.

CoT Prompting => this paper construct three-hop prompts on follows

Step 1: ask LLMs what aspect & is mentioned.

C, [Given sentance X]: which specific aspect of t is possibly mentioned?

it is the first-hop promption context.

intermediate aspect term

C: latent opinion

F. final polarity.

t: target term, t C X

 $A = \underset{\alpha \in \mathcal{A}}{\operatorname{argmax}} P(\alpha | X, \bullet_{\underline{t}}) \rightarrow A$ is the output text which explicitly mentions the aspect A.

Step 2: based on X, \pm, d , we ask LLM. to answer in detail what would be the underlying opinion \underline{O} towards the mentioned aspect \underline{O}

C2[C1, A]: based on the common sense, what is the implict opinion and why?

It is the second-hop prompt context

 $A O = \operatorname{argmax} P(Q|X, \pm, Q) \rightarrow O$ is the answer text containing the possible opinion expression Q

Step 3: with the complete sentiment skeleton $(X, t, \mathbf{A}Q, \underline{o})$ as context, ask LLM to infer the final answer of polarity t. $C_3[C_2, 0] \rightarrow it$ is the third-hop prompt context.

\$ = augmax p(x| x, + Q, 0)

Treatility to the treatile

Enhancing Reasoning via Self-consistency.

this paper leverage the self-consistency machinism to consolidate the reasoning correctness.

for each of three reasoning steps, this paper set the UM decoder to generate multiple answer, each of which will likely to give varied predictions of \varnothing , ϱ , \varnothing , select the one with highest confidence as the context in next step.

Reasoning Revising with Supervision

feed it into UM to predict the sentiment label,

instead of going to the next step reasoning.

(e.g) at the end of step-1, we can assemble a prompt:

[C1, A, "what is the centiment polarity towards t"]