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Stance Reasoner: Zero-Shot Stance Detection on Social Media with Explicit Reasoning

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Stance Detection Task

Zero-shot stance detection

- It identifies the stance on new targets
- It requires
 - background knowledge
 - stance reasoning strategies

Social media is a challenging context

- Ambiguity, vagueness in the language.
- Cultural and linguistic diversity.
- The presence of implicit social cues.
- Use of slang, informal expressions and emojis.

Target: Hillary Clinton



"She can't even manage her husband and she wants to be @POTUS"

Background knowledge:

- *@POTUS* is the Twitter handle for the president of the US.
- *Hillary Clinton* is the Democratic party nominee for president in the 2016 presidential election.

Reasoning:

- **Premise**: Hillary Clinton is not qualified to be president because of her poor managing abilities.
- Conclusion: The author is against Hillary Clinton.



Stance: Against

Stance Reasoner: Overview

A framework for zero-shot stance detection on social media that leverages explicit reasoning over background knowledge to guide the model's inference about the document's stance on a target.





Stance Reasoner: In-Context Learning

Prompt = **Task description** + Examples

"The **performance** of a **prompt** is coupled with the extent to which the **model** is **familiar** with the language it contains" (Gonen et al., 2022)



Stance Reasoner: CoT Reasoning

Prompt = Task description + **Examples**

"Access to diverse reasoning strategies is the key to enabling LMs to reason." (Shum et al, 2023)

Manually select in-context CoT examples based on:

1. Target implicitness

 whether the target is explicitly discussed in the document or whether it is implied

2. Rhetorical devices

 whether the stance is expressed via sarcasm, jokes, aphorism, rhetorical question, etc.

tweet: I'm sick of celebrities who think being a well known actor makes them an authority on anything else. #robertredford #UN target: Liberal Values **reasoning:** the author is implying that celebrities should not be seen as authorities on political issues, which is often associated with liberal values such as Robert Redford who is a climate change activist -> the author is against liberal values stance: against tweet: If a woman chooses to pursue a career instead of staying at home, is she any less of a mother? target: Conservative Party **reasoning:** the author is guestioning traditional gender roles, which are often supported by the conservative party -> the author is against the conservative party stance: against





Experimental Results

Average Macro F1 Scores by Model Category 72.6 70 68.5 65.9 64.3 60 58.3 53.3 52.5 52.4 50.5 50 46.4 46.1 45.8 45.8 45.7 45.5 a 40 Score 30 20 10 0 TOANEL TOAD ERICON **I**ointCL

Performance Highlights

- Outperforms all unsupervised and supervised models
- High gains on challenging • targets (e.g., +32 F1 points on atheism)
- Adding CoT to zero-shot ٠ reduced performance

Models

Key Insight

Stance Reasoner's ability to employ diverse reasoning strategies effectively generalizes its performance across new and unseen targets



Prompt Generalization



Models

Qualitative Analysis

	#	Example	True	Pred	Reasoning	Conf.
Annotation Errors		Tweet: It's most exciting to witness a major development! @urgenda Target: Climate Change is a Real Concern	none	favor	Premise: the author is excited about the major development of an organi- zation that tackles climate change Conclusion: the author is in favor of climate change is a real concern	1.0
Ambiguous Context	2	Tweet: One thing I learned from my job: doors to opportunity cover fee that only the privileged can afford. #privilege #truth Target: Feminist Movement	against	none	Premise: the author is in favor of truth Conclusion: the author is neutral towards the feminist movement	0.4
Rhetorical devices	3	Tweet: @cbrangel so, you support the choice of wether or not you'd like to kill someone? Would you kill a born baby? Target: Legalization of Abortion	against	against	Premise: the author is against the idea of people choosing to kill other people Conclusion: the author is against the legalization of abortion.	0.4



Conclusion

- Stance Reasoner integrates explicit reasoning to effectively handle zeroshot stance detection on social media via:
 - In-context learning
 - Chain-of-thought prompting
 - Self-consistency
- Demonstrates enhanced accuracy with an average F1 score of 72.6, outperforming both supervised and unsupervised models on 3 Twitter datasets
- Can be used to find annotation errors, ambiguous or difficult inputs

