

AI Argues Differently: Distinct Argumentative and Linguistic Patterns of LLMs in Persuasive Contexts

Esra Dönmez^{♦1,2}, Maximilian Maurer^{★3,4}, Gabriella Lapesa^{3,4}, Agnieszka Falenska^{1,2}


¹Institute for Natural Language Processing, University of Stuttgart

²Interchange Forum for Reflecting on Intelligent Systems, University of Stuttgart

³GESIS Leibniz Institute for the Social Sciences ⁴Heinrich-Heine University Düsseldorf

[♦]esra.doenmez@ims.uni-stuttgart.de [★]maximilian.maurer@gesis.org

Motivation

←  r/changemyview · 5 mo. ago
AutoModerator

META: Unauthorized Experiment on CMV Involving AI-generated Comments

META

The CMV Mod Team needs to inform the CMV community about an unauthorized experiment conducted by researchers from the University of Zurich on CMV users. This experiment deployed AI-generated comments to study how AI could be used to change views.

 NPR

U.S. says Russian bot farm used AI to impersonate Americans

The U.S. Department of Justice said it disrupted a Russian propaganda campaign using fake social media accounts, powered by artificial...

9 Jul 2024



What differentiates LLM-generated from human-written arguments?

Is this Argument Generated?

A Feature Perspective

While it is true that automation is changing the landscape of the job market, it doesn't necessarily mean that human beings will become completely pointless in the future. Automation has the potential to create new job opportunities in industries that we can't even imagine yet. Just think about the jobs that exist today that didn't exist 20 years ago, such as social media manager or app [...]

Is this Argument Generated?

A Feature Perspective

length

While it is true that automation is changing the landscape of the job market, it doesn't necessarily mean that human beings will become completely pointless in the future. Automation has the potential to create new job opportunities in industries that we can't even imagine yet. Just think about the jobs that exist today that didn't exist 20 years ago, such as social media manager or app [...]

Is this Argument Generated?

A Feature Perspective

While it is true that automation is changing the landscape of the job market, it doesn't necessarily mean that human beings will become completely pointless in the future. Automation has the potential to create new job opportunities in industries that we can't even imagine yet. Just think about the jobs that exist today that didn't exist 20 years ago, **such as** social media manager or app [...]

logical connectors

Is this Argument Generated?

A Feature Perspective

While it is true that automation is changing the landscape of the job market, it doesn't necessarily mean that human beings will become completely pointless in the future. Automation has the potential to create new job opportunities in industries that we can't even imagine yet. Just think about the jobs that exist today that didn't exist 20 years ago, such as social media manager or app [...]

Linguistic features

How long is an argument?

How *creative* the word use?

Using emotion-associated words?

Argument quality dimensions

How logically sound is an argument?

How rhetorically impactful?

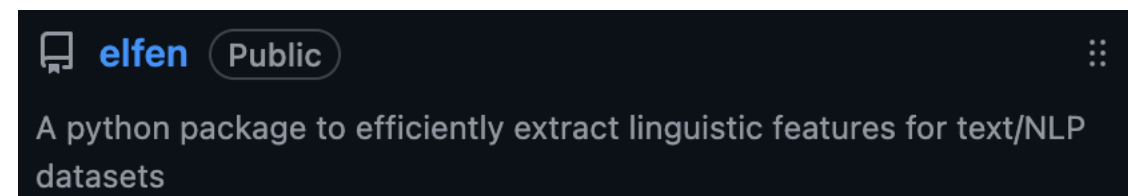
Is this Argument Generated?

A Feature Perspective

While it is true that automation is changing the landscape of the job market, it doesn't necessarily mean that human beings will become completely pointless in the future. Automation has the potential to create new job opportunities in industries that we can't even imagine yet. Just think about the jobs that exist today that didn't exist 20 years ago, such as social media manager or app [...]

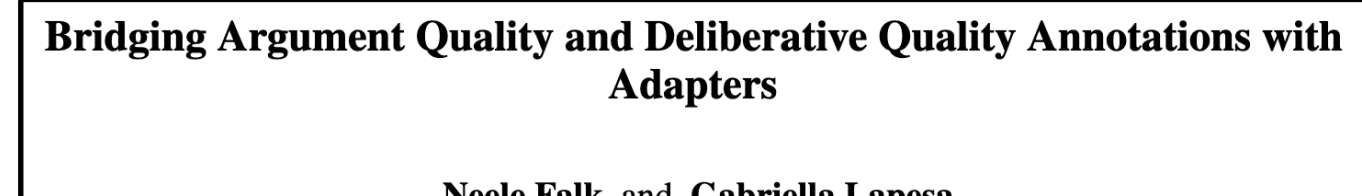
Linguistic features

How long is an argument?
How *creative* the word use?
Using emotion-associated words



Argument quality dimensions

How logically sound is an argument?
How rhetorically impactful?



Data

- Humans: Winning Arguments

- CMV data:
13,498 posts (OP) + comments

- LLMs:

- Mistral 7B, Llama 2 7B, GPT 3.5-turbo
- Minimal prompt to assess *default behavior*

OP TEXT

You have one chance
to change my view.
Answer:

ChangeMyView: Atheists in Western nations aren't currently being persecuted or oppressed in any meaningful way

There was a time, long ago, when atheists were persecuted in North America and Europe, but I don't really think it's a big deal any more. People just want to cash in on the victim complex nowadays, and atheists are the worst for this. I can't think of a single area of society where atheists would face social disadvantage [...]



In some states it is illegal to hold public office and be an Athiest. And to your second point, I don't know about the other states, but here in AR you have to publicly acknowledge your belief in God to hold a liquor license at your place of business. My atheist co-worker [...]

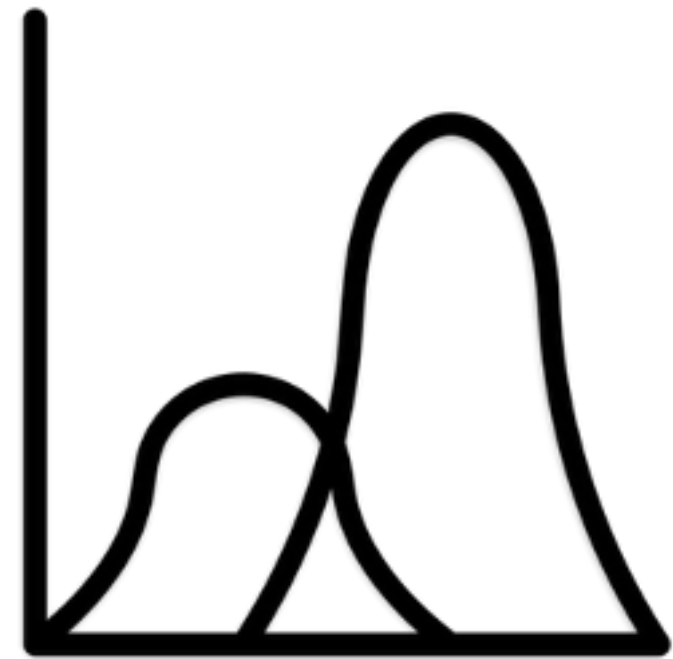


I understand where you're coming from, but it's important to recognize that discrimination against atheists still exists in many parts of the world. In some countries, atheists face legal repercussions, social ostracism, and even violence for their lack of belief in a higher [...]

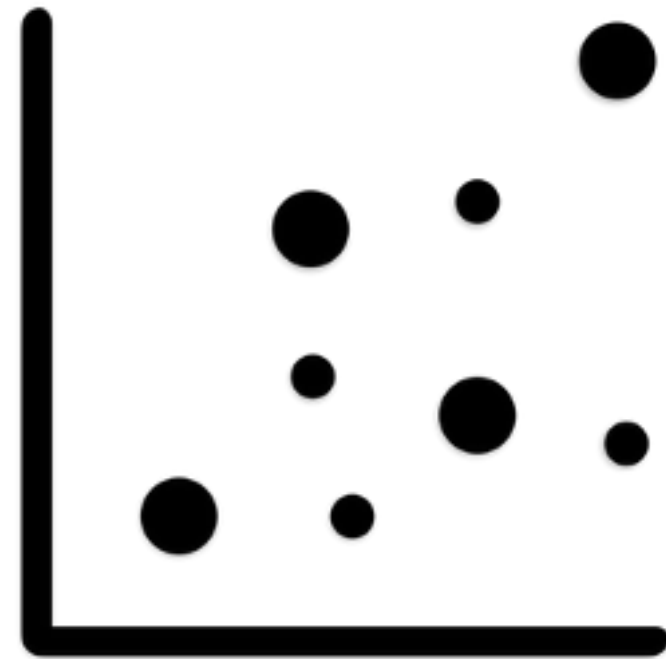
Research Questions

1. What linguistic and argument quality features characterize LLM-generated counter-arguments, and how do they differ from human-written ones?
2. To what extent do LLMs align with the style and quality of the original posts, and do they follow different convergence patterns from humans?
3. Can differences between human-written and LLM-generated arguments be used to effectively detect AI-generated content?

Experimental Settings

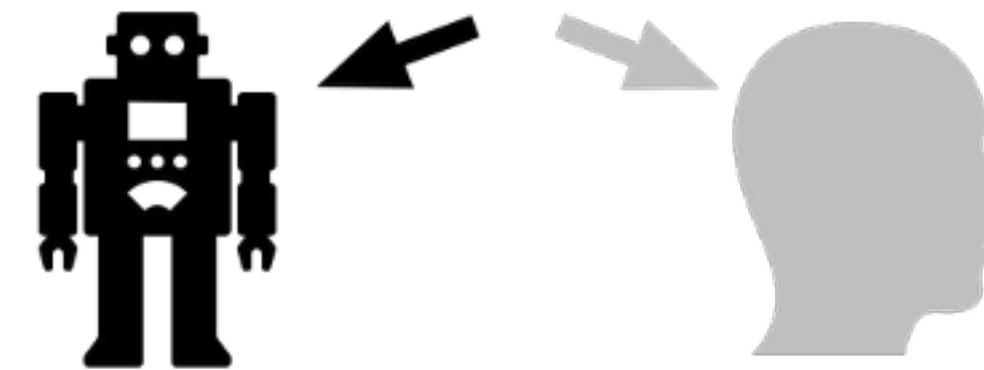


**Distributional Level:
Wasserstein Distance**



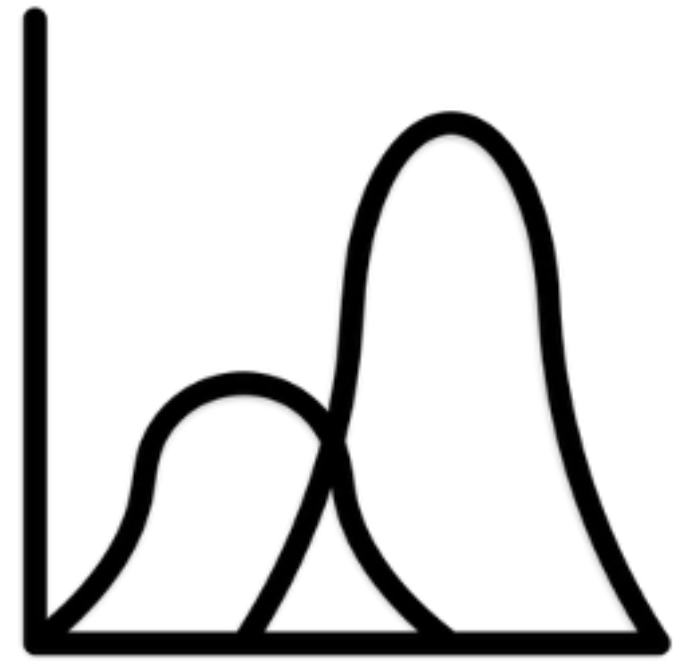
**Parallel Arguments:
Correlation**

While it is understandable to have fears and uncertainties about what may come after death, it is also important to consider the possibility of a peaceful and fulfilling afterlife. Many belief systems [...]

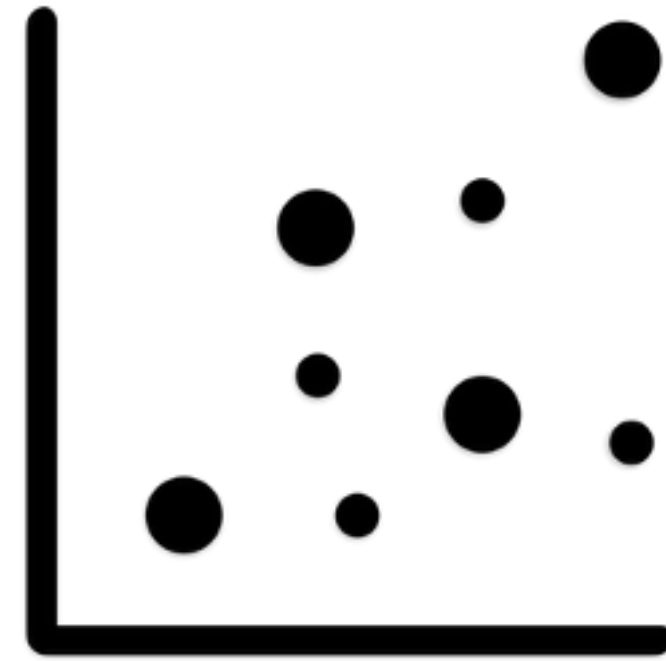


**Authorship:
Classification**

Experimental Settings

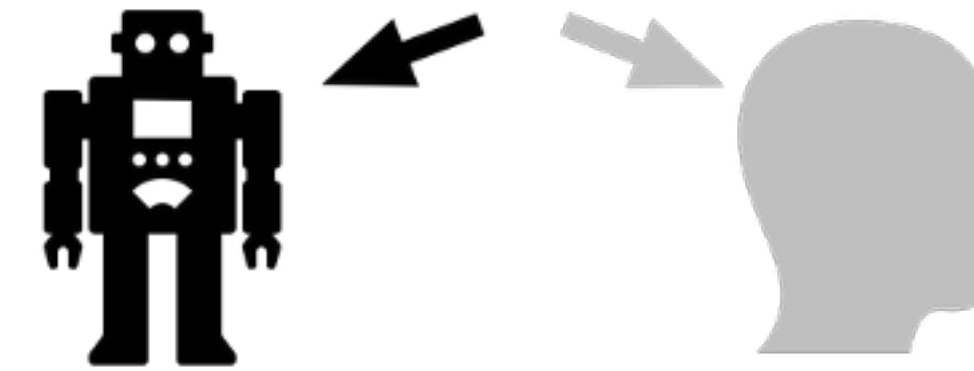


**Distributional Level:
Wasserstein Distance**



**Parallel Arguments:
Correlation**

While it is understandable to have fears and uncertainties about what may come after death, it is also important to consider the possibility of a peaceful and fulfilling afterlife. Many belief systems [...]



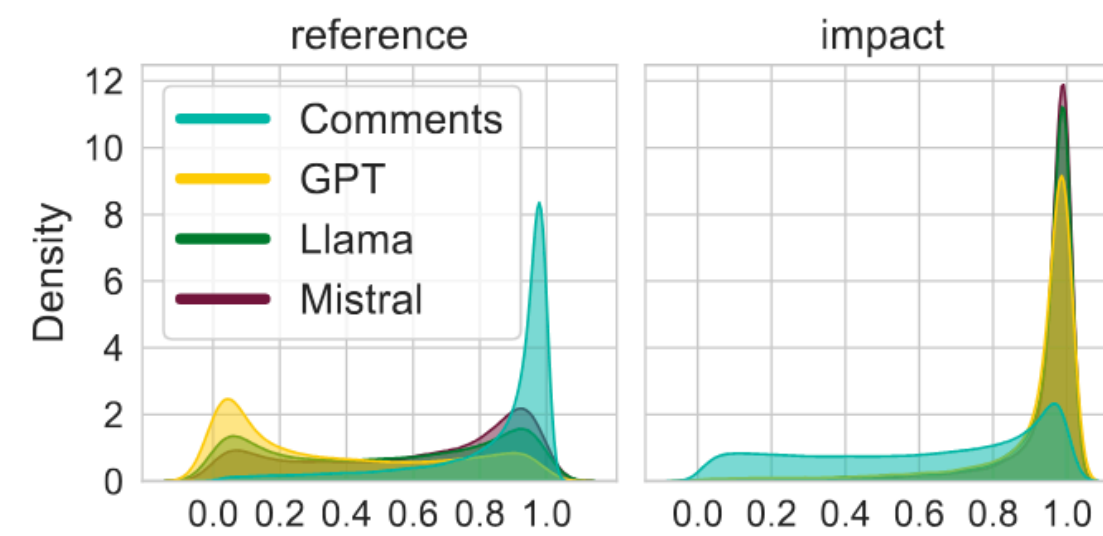
**Authorship:
Classification**

TEXT

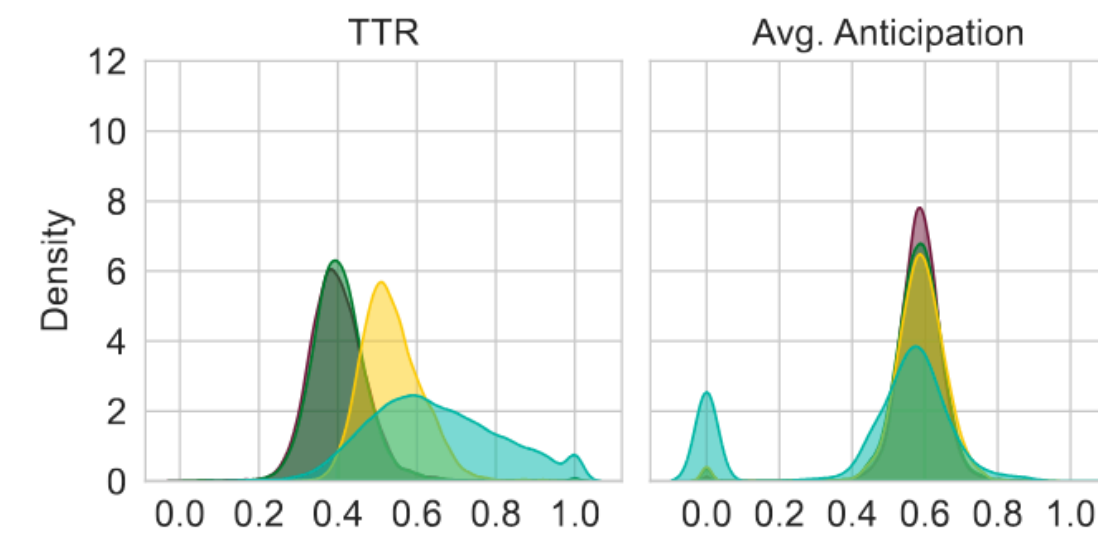


RQ1: Characteristics of LLMs

Dimension	<i>WS</i>
reference	0.35
impact	0.31
interactivity ⁺	0.28
effectiveness	0.24
respect ^{explicit}	0.23
respect ^{implicit}	0.21
quality	0.20
justification ⁺⁺⁺	0.10



(a) Argument Quality Features



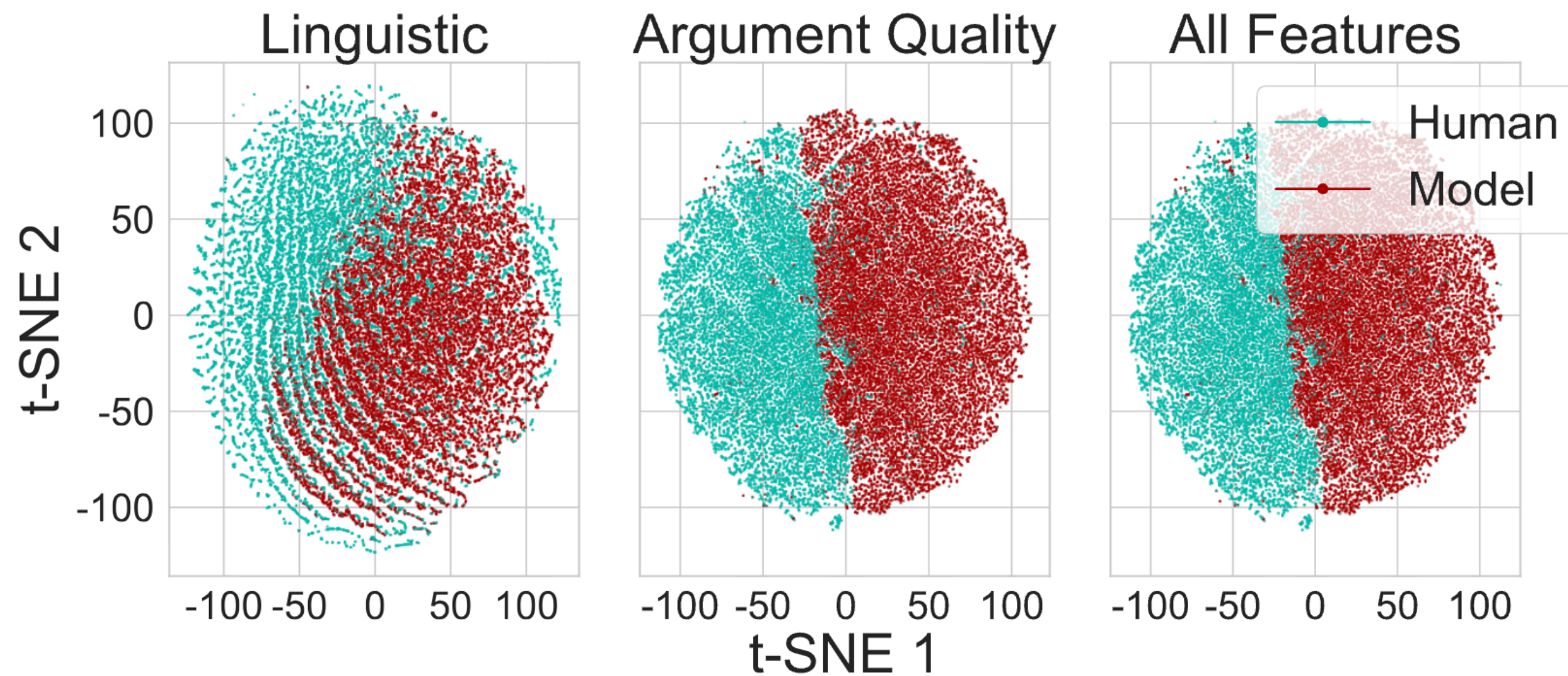
(b) Linguistic Features

Feaure	<i>WS</i>
Type token ratio (TTR)	0.20
Lemma token ratio (LTR)	0.19
Avg. intensity anticipation	0.13
POS variability	0.12
Herdan's C	0.11
Avg. intensity trust	0.11

LLMs produce more textbook-like arguments.

Humans are more creative and show higher variance.

RQ3: Classification



Features	<i>A</i>	<i>P</i>	<i>R</i>	<i>F1</i>
Argument Quality	.9808	.9846	.9834	.9840
Linguistic	.9885	.9927	.9881	.9904
All Features	.9927	.9952	.9927	.9939

LLM-generated and human-written CMV comments are linearly separable.

Conclusion

RQ1 - LLM characteristics:

**Humans show more variance and creativity,
LLMs write more formulaic and textbook-like**

RQ2 - Convergence with OPs:

LLMs show stronger convergence with OPs and each other than humans

RQ3 - Detectability:

Interpretable features can be used for light-weight detection of LLMs

For additional experiments, details,
links to the code and the enriched data
check the paper!