

Argument Mining for Green Nutrition

SODAS-Climate
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Introduction

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Natural Language Processing

An example application: debating

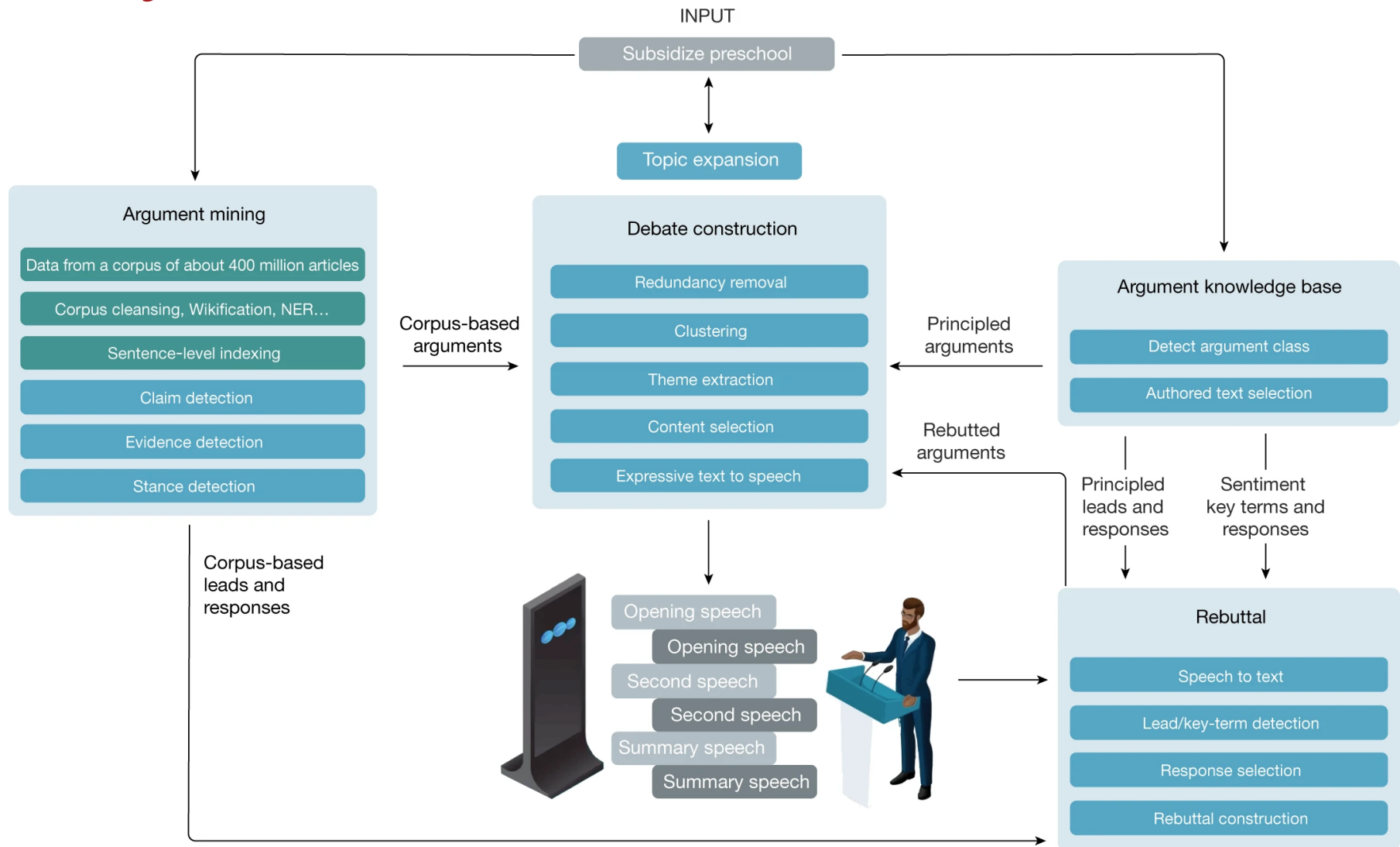


	Pre-debate: both sides receive the motion and prepare	15 min
	Moderator introduces the motion to the audience	
Opening speeches	Project Debater delivers the 'government' opening speech	4 min
	Human debater delivers the 'opposition' opening speech and replies	4 min
Second speeches	Project Debater offers rebuttal and additional points	4 min
	Human debater offers rebuttal and additional points	4 min
Summary speeches	Project Debater provides final rebuttal and closing statements	2 min
	Human debater provides final rebuttal and closing statements	2 min

An autonomous debating system

Slonim et al. (Nature 2021)

Project Debater



An autonomous debating system

Slonim et al. (Nature 2021)

Claim verification

Claim:

"The melting Greenland ice sheet is already a major contributor to rising sea level and if it was eventually lost entirely, the oceans would rise by six metres around the world, flooding many of the world's largest cities."

Evidence:

"The Greenland ice sheet occupies about 82% of the surface of Greenland, and if melted would cause sea levels to rise by 7.2 metres."

SUPPORTS

Claim verification

Claim:

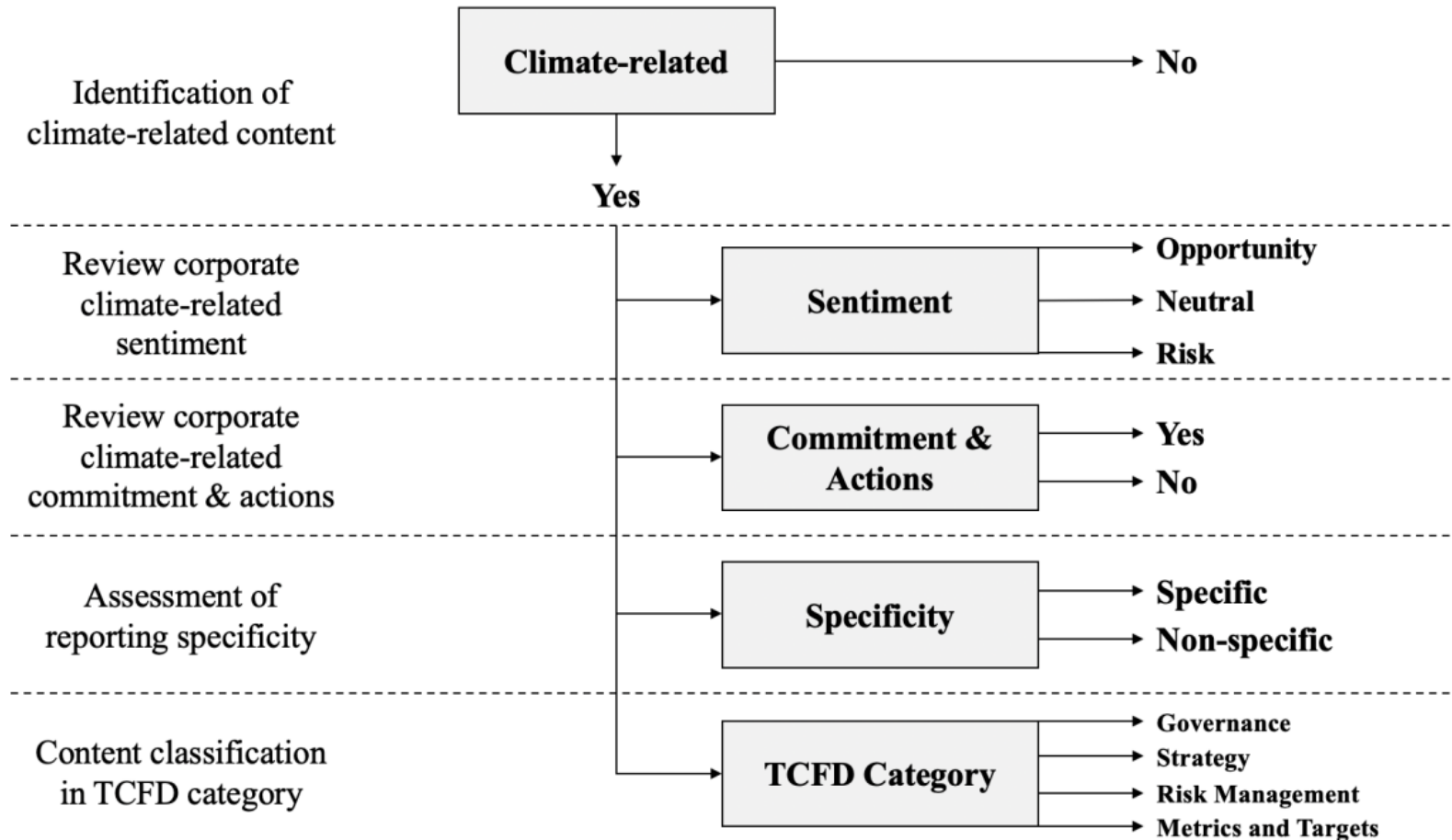
"Human-produced carbon might be one of the factors of climate change, but there's simply no evidence that it is a significant one."

Evidence:

"There is now convincing evidence that since the industrial revolution, human activities, resulting in increasing concentrations of greenhouse gases have become a major agent of climate change."

REFUTES

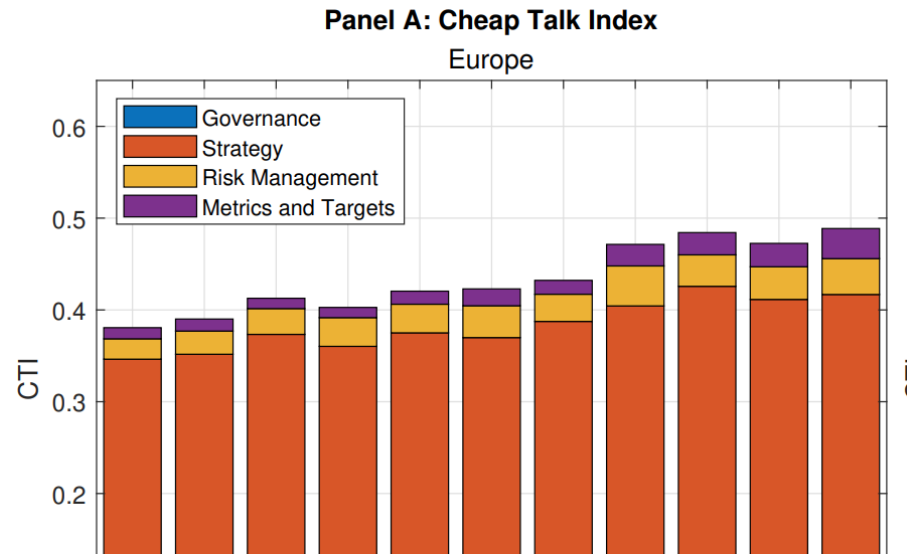
Greenwashing detection



Cheap Talk in Corporate Climate Commitments: The Role of Active Institutional Ownership, Signaling, Materiality, and Sentiment

(Bingler et al., Swiss Finance Institute 2022)

Greenwashing detection



How much CO2eq was emitted to train the final model?	2.63 kg
How much CO2eq was emitted for all experiments?	94.75 kg
What is the average CO2eq emission for the inference of one sample?	0.62 mg

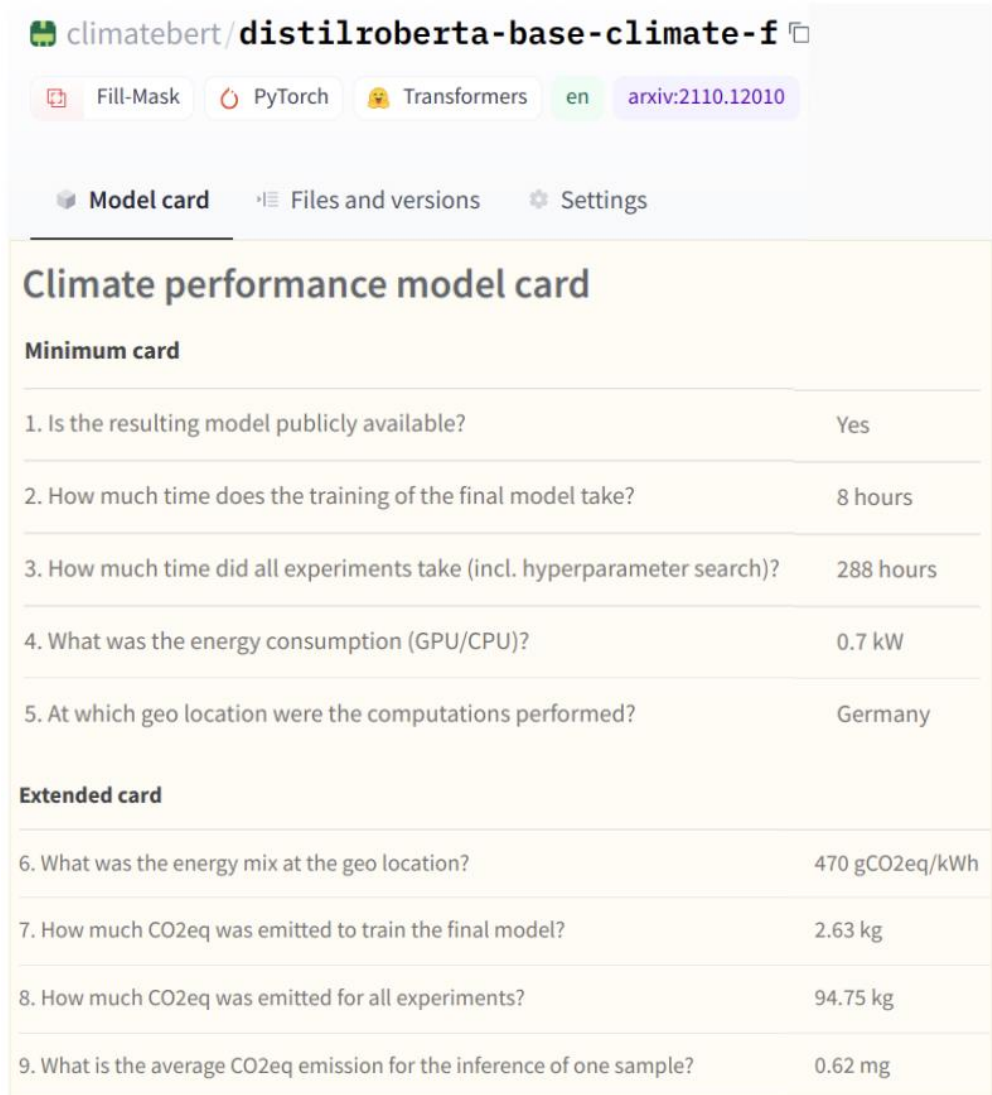
Cheap Talk in Corporate Climate Commitments: The Role of Active Institutional Ownership, Signaling, Materiality, and Sentiment
(Bingler et al., Swiss Finance Institute 2022)

Climate awareness

Principles:

- Relevance
- Completeness
- Consistency
- Transparency
- Accuracy

+ Positive impact

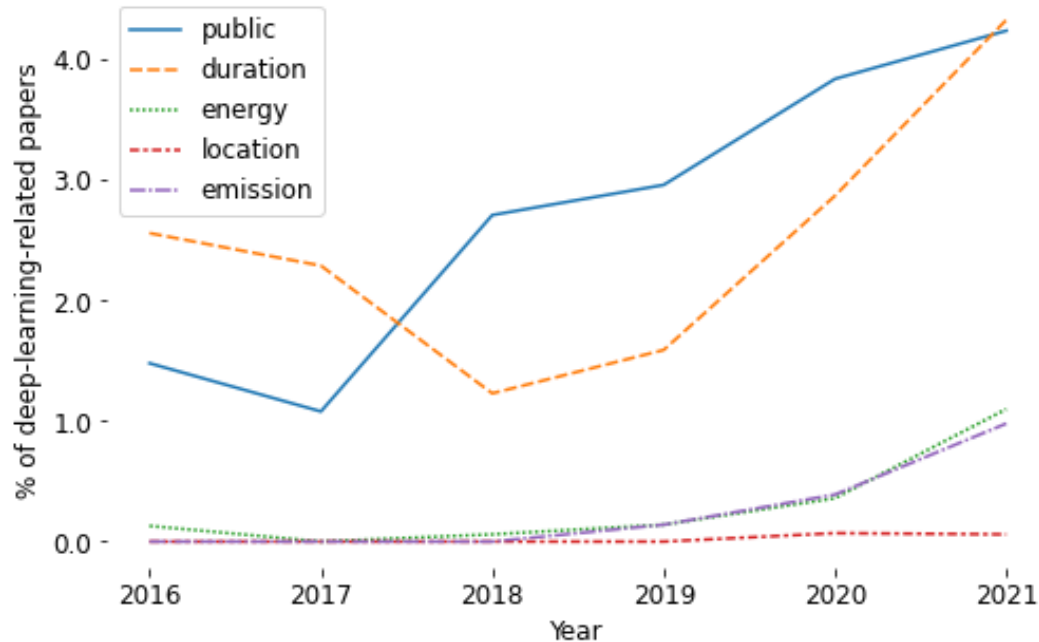


The screenshot shows a Hugging Face Model card for the model 'climatebert/distilroberta-base-climate-f'. The card includes a header with the model name and a 'Model card' tab. Below the header, there is a 'Climate performance model card' section with a 'Minimum card' and an 'Extended card'. The 'Minimum card' contains five questions about the model's availability, training time, experiment time, energy consumption, and geo location. The 'Extended card' contains four additional questions about energy mix, CO2eq emissions for training and inference, and average CO2eq emission for inference.

Climate performance model card	
Minimum card	
1. Is the resulting model publicly available?	Yes
2. How much time does the training of the final model take?	8 hours
3. How much time did all experiments take (incl. hyperparameter search)?	288 hours
4. What was the energy consumption (GPU/CPU)?	0.7 kW
5. At which geo location were the computations performed?	Germany
Extended card	
6. What was the energy mix at the geo location?	470 gCO2eq/kWh
7. How much CO2eq was emitted to train the final model?	2.63 kg
8. How much CO2eq was emitted for all experiments?	94.75 kg
9. What is the average CO2eq emission for the inference of one sample?	0.62 mg

Towards Climate Awareness in NLP Research
(Hershcovich et al., 2022)

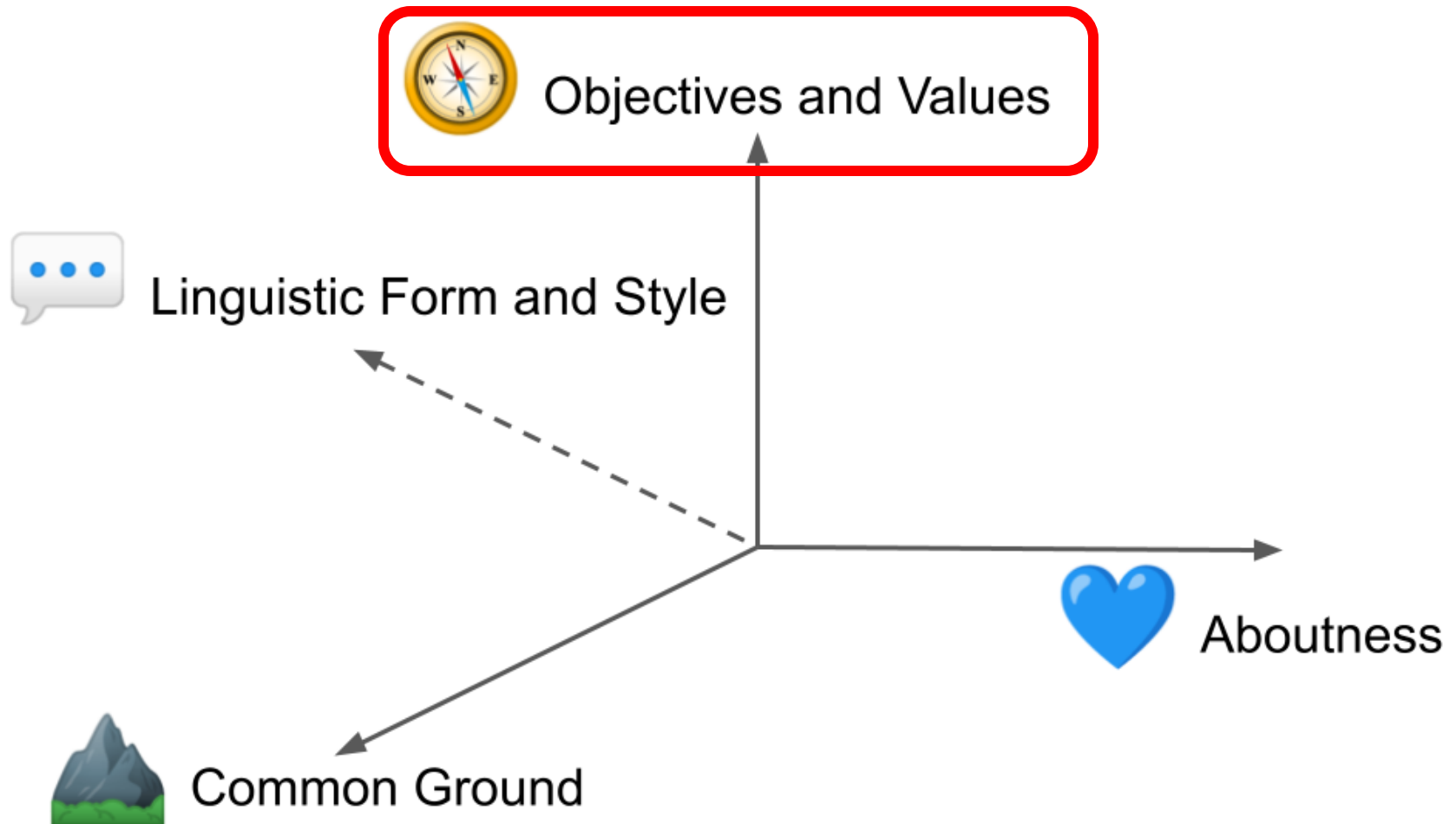
Climate awareness in NLP



Mainstream climate awareness requires changing the culture

Towards Climate Awareness in NLP Research
(Hershcovich et al., 2022)

Cultural awareness in NLP

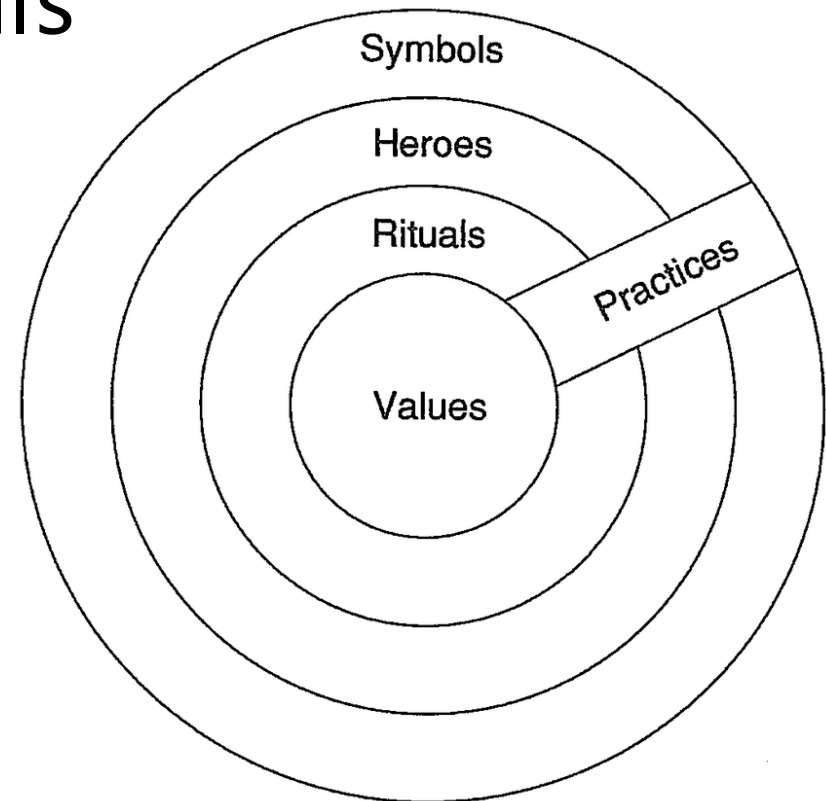


Challenges and Strategies in Cross-Cultural NLP
(Hershcovich et al., ACL 2022)

Values

Objectives and goals people strive for

- What is considered desired or desirable



Cultures and Organizations: Software of the Mind
(Hofstede, 1991)

(Meta) values

Why are we doing this research?

- Stakeholders have different goals, often implicit



No single correct answer.

Changing the World by Changing the Data

(Rogers, ACL 2021)

Interim summary



Climate awareness will make efficient NLP mainstream

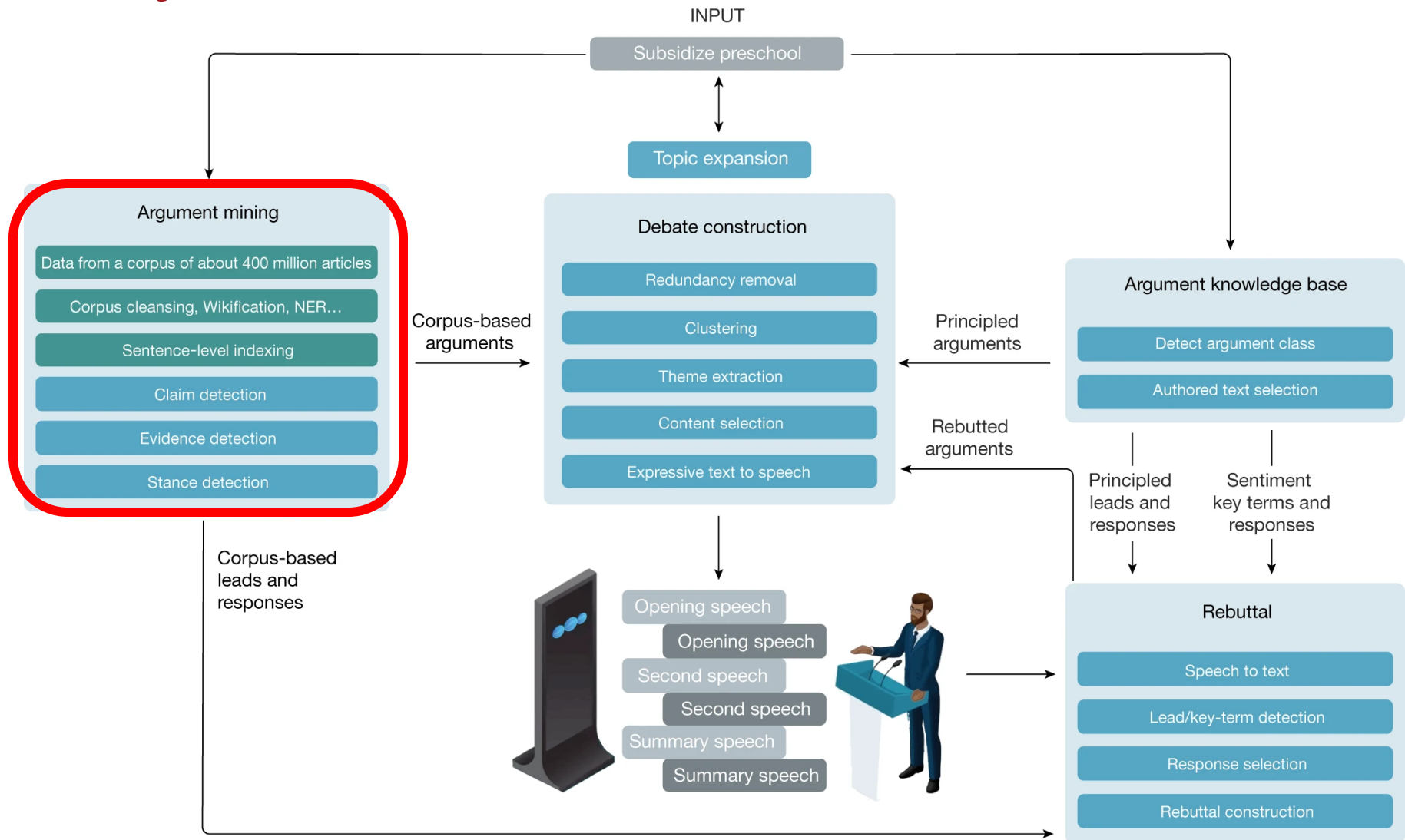


Efficient is not enough – net impact should be positive



NLP can verify compliance and affect consumer behavior

Project Debater



An autonomous debating system
Slonim et al. (Nature 2021)

Argument Mining for Green Nutrition

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Argument mining for green nutrition

- Dietary preferences are hard to change:
 - Perceptions of taste
 - Knowledge and skills
- Existing interventions:
 - Guidelines and policies
 - Everyday habits and convenience



Overview

- Dataset and models for mining arguments on Twitter



Obtaining tweets for annotation

Scraping:

1

Mix of keywords and n-grams extracted from topics

2

Retrieve a mixed set of English and Danish tweets

3

Remove non-discourse tweets

4

Total corpus of 32840 tweets

Obtaining tweets for annotation

Filtering:

Informational
retrieval model
scores tweets on
topics

Randomly sample
250 tweets and
combine them with
350 IR tweets

Condensed set of
600 English tweets
for crowd
annotation

Topics for annotation

Topic – a short, usually controversial statement that defines the subject of interest; it is **clear** and **dividing** where claim and evidence have a **clear stance** towards it.

Topics for annotation

Our Topics:

We should reduce the consumption of meat

Plant based food should be encouraged

Meat alternatives should be encouraged

Vegan and vegetarian diets should be encouraged

We should pursue policies that promote sustainable foods

Annotation methodology

Labels:



Argumentative - text contains argumentative structures such as claims or evidence while having a clear stance towards a topic



Claim – a standpoint towards the discussed topic implicitly or explicitly



Evidence - statement used to support or attack a topic or claim

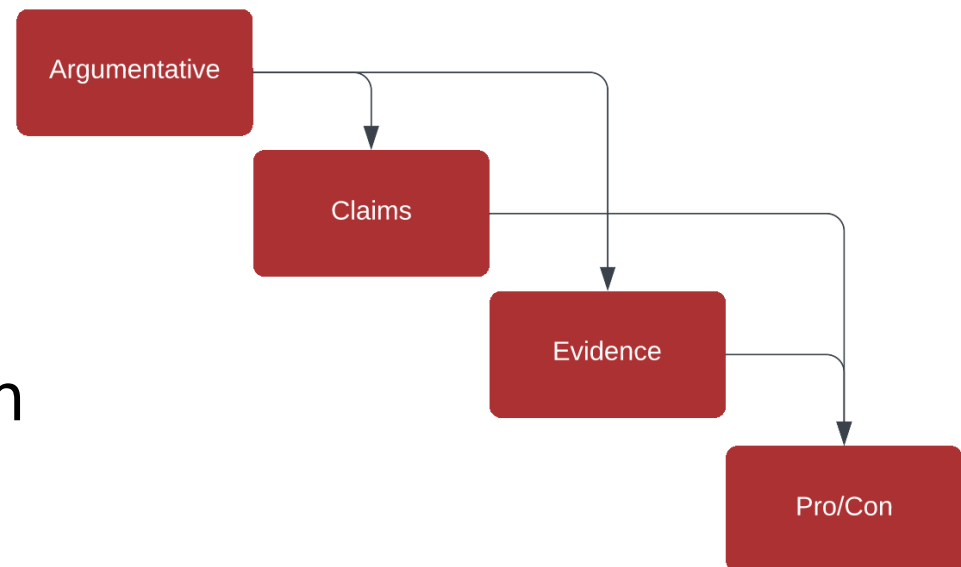


Pro/con - the stance of a claim or the evidence towards the discussed topic

Annotation methodology

Crowdsourced Annotations:

- Sample of 600 tweets annotated for the 5 topics
- Amazon MTurk for sourcing annotations
- Currently fully sourced annotations for argumentative and claim



Examples

Topic: Plant based food should be encouraged

Tweet: <MENTION> Many fruit & veg (which contain natural acid) don't trigger flare ups- The list is long and varied (obs this may not apply to you) but after a little digging I found some doctors do recommend a plant based diet to ease the inflammation. Going meatless is even recommended by ICA

Label: Claim, Evidence and Pro

Topic: Meat alternatives should be encouraged

Tweet: <MENTION> People need to stop trying to recreate meat without the...ya know meat

Label: Claim and Con

Examples

Topic: We should reduce the consumption of meat

Tweet: Green taxes go into subsidizing development and production of green energy solutions. If we were on 100% renewables, our electricity prices would not have needed to go up. We need to move into self-sufficient green energy as soon as possible

Label: Argumentative but unrelated

Topic: We should reduce the consumption of meat

Tweet: <MENTION> <MENTION> Lol - and the wash post is the PR firm and Whole Foods is the official food supplier

Label: Not argumentative

Modelling

- Train models to predict labels for tweet, topic pairs

Baseline experiments

Majority class

BM-25

QA retrieval models

IBM Debater models available via API

Modelling experiments

- BERT embeddings + XGBoost (10-fold cross validation)
- Finetuned BERT (10-fold cross validation)

Features	Target	Preproc	F1	Precision	Recall
Majority Class	Argumentative		0.65	0.65	0.65
10 Fold - BERT + XGBoost	Argumentative		0.78	0.72	0.86
10 Fold - Fine-tuned BERT	Argumentative		0.65	0.65	0.65
Majority Class	Claim		0.73	0.73	0.73
BM25	Claim		0.5	0.5	0.5
QA-retrieval model	Claim		0.65	0.65	0.65
IBM 0 shot	Claim		0.33	0.36	0.31
10 Fold - BERT + XGBoost	Claim		0.23	0.25	0.21
10 Fold - Fine-tuned BERT	Claim		0.69	0.69	0.69

Table 7: Preliminary results for only argumentative and claim for crowd-sourced data

Preliminary results

Planned

- Gather labels for evidence and pro/con
- Repeat modelling experiments for new labels
- Balance dataset
- Hyper-parameter tuning
- Multi-task finetuned BERT as last model

Potential applications



Surveying public attitudes and exposing misinformation



Generation of convincing arguments for communication campaigns



Understanding public knowledge of sustainable diets

Summary

- Dataset and models for mining arguments on Twitter



Opportunity for integration

- Cultural differences in consumer preferences



Thank you

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