Steinbeis Transfer Center
Linguistic Data Analysis

ARG-tech
Centre for Argument Technology

Universität
Konstanz

Debate Technology for Empowering the Public: Insights and Avenues

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Touché @ CLEF (virtually), 23 September 2020

Cluster of Excellence
The Politics of Inequality

Debate technology

https://www.research.ibm.com/artificial-intelligence/project-debater/

NLP: The last decade

- Importance of statistical models: discourse coherence, argument mining, sentiment analysis, conversational AI, etc.

- Ever increasing amount of textual (and now also spoken) data available.

But:

- Most of the data is “raw” (just the text) or annotated shallowly (e.g., part of speech)

- Annotation is expensive.

NLP: The last decade

- Because annotation is expensive:
  - Most of the methods to extract information are shallow.
    - Number of tokens/types, type/token ratio
    - N-grams (which words are next to which other words)
  - Or low-level annotation (e.g., Part-of-Speech Tagging)
- This has proven to be useful enough for many NLP tasks.

Starting to reach the limit of what we can do with statistics.

Debating in the wild

(1) Michael Buerk: *Michael Portillo?*

Michael Portillo: *I suppose it's difficult for savers to take the high moral ground, because… aren't they lenders? And if they're lenders, that implies there are borrowers.*

Simon Rose: *Oh yes, of course. I mean there should be both savers and borrowers, naturally. I mean what savers are doing, by delaying consumption, is providing the capital that one hopes will go to create growth in the economy.*

Michael Portillo: *But I wonder if it's, as it were, intellectually honest to kind of play out the virtues of saving, as opposed to borrowing, when really, unless the two kind of balance out in an economy, there's no point saving. If somebody's not willing to reward you by borrowing your savings, there's no point doing the saving.*

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Computational rhetoric

Computational rhetoric as way of automatically identifying and explicating

- the intention of speakers
- their rhetorical strategies
- the way argumentation unfolds in dialogue
- the network of explicit and implicit discourse information

→ We need to combine theoretical linguistics insights with statistical models of language.

Rhetorical packaging

Hautli-Janisz and Butt 2016:

Insight #1: Particles (*ja, doch, schon, halt, mal,* etc.*)* are highly frequent in dialogical argumentation in German.

Relative frequencies of explicit argument relations containing discourse particles

	Premise	Conclusion	Contrast	Concession	Condition
Stuttgart21	0.28	0.32	0.20	0.08	0.23
Fracking	0.39	0.46	0.30	0.10	0.34
Africa	0.40	0.43	0.23	0.15	0.29

Annette Hautli-Janisz and Miriam Butt. 2016. On the role of discourse particles for mining arguments in German dialogs. In Proceedings of the COMMA 2016 workshop 'Foundations of the Language of Argumentation', pp. 10-17.

Rhetorical packaging

Hautli-Janisz and Butt 2016:

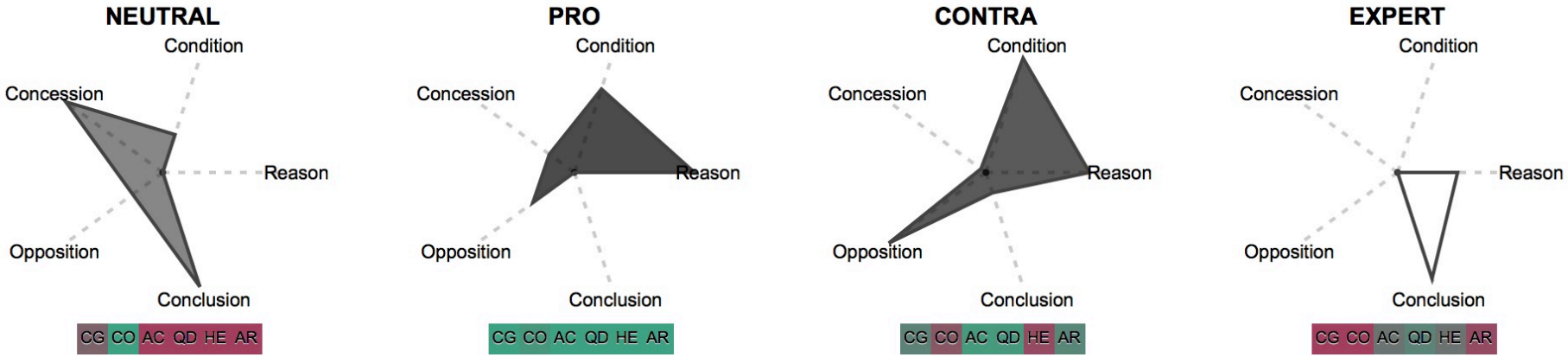
Insight #2: Rhetorical information contributed by particles can be categorized and used for computational purposes.

Dimension	Subdimension	Example
Common ground	Refer to cg	*ja* 'yes'
	Reject cg	*doch wohl* 'lit. indeed probably'
	Update cg	*doch mal* 'lit. indeed sometime'
Constraint	Immutable constraint	*halt* 'stop', *eben* 'even'
	External constraint	*mal* 'sometime'
Accommodation	Consensus	*ja* 'yes'
	Consensus-willing	*nicht wahr* 'lit. not true'= 'right'
	Concession	*immerhin* 'at least'
Question under discussion (QUD)	Move to higher qud	*überhaupt* 'lit. anyway'
	Move to other qud	*eigentlich* 'actually'
Hedging	Attenuation	*möglicherweise* 'possibly'
	Reinforcement	*jedenfalls* 'anyway'

Annette Hautli-Janisz and Miriam Butt. 2016. On the role of discourse particles for mining arguments in German dialogs. In Proceedings of the COMMA 2016 workshop 'Foundations of the Language of Argumentation', pp. 10-17.

Rhetorical strategies

Hautli-Janisz and El-Assady 2017: Visualization of rhetorical strategies in S21



Annette Hautli-Janisz and Mennatallah El-Assady. 2017. Rhetorical strategies in German argumentative dialogs. Argument & Computation, 8(2), pp. 153-174.

ADD-up: Augmented Deliberative Democracy

VolkswagenStiftung

Computational Social Science, 2017-2021

Two co-applicants: Valentin Gold (Göttingen, PolSci), Brian Plüss and Conor McKillop (ARG-tech, Dundee, CS)

The ADD-up system

Brian Plüss, Mennatallah El-Assady, Fabian Sperrle, Valentin Gold, Katarzyna Budzynska, **Annette Hautli-Janisz** and Chris Reed. 2018. ADD-up: Visual Analytics for Augmented Deliberative Democracy. 2018. In Proceedings of 7th International Conference on Computational Models of Argument, Demo Paper, pp. 471-473.

Implicit dialogue structure

Argumentation is mostly implicit:

- Indicators like *because*: precision of around 90%, recall of around 4% (Lawrence and Reed, 2015).

More implicit material:

- Conventional implicatures (Grice 1975, Karttunen and Peters 1979, Potts 2005, inter alia):

(2) [Alice:] *Luckily*, Willie won the pool tournament. (Potts, 2005, p. 139)
[Bob:] That's not good, though.

Implicit dialogue structure

Conventional implicature (Potts 2005)

Willie winning the pool tournament is positive

Willie won the pool tournament — Assertion

[Alice:]
Luckily, Willie won the pool tournament.

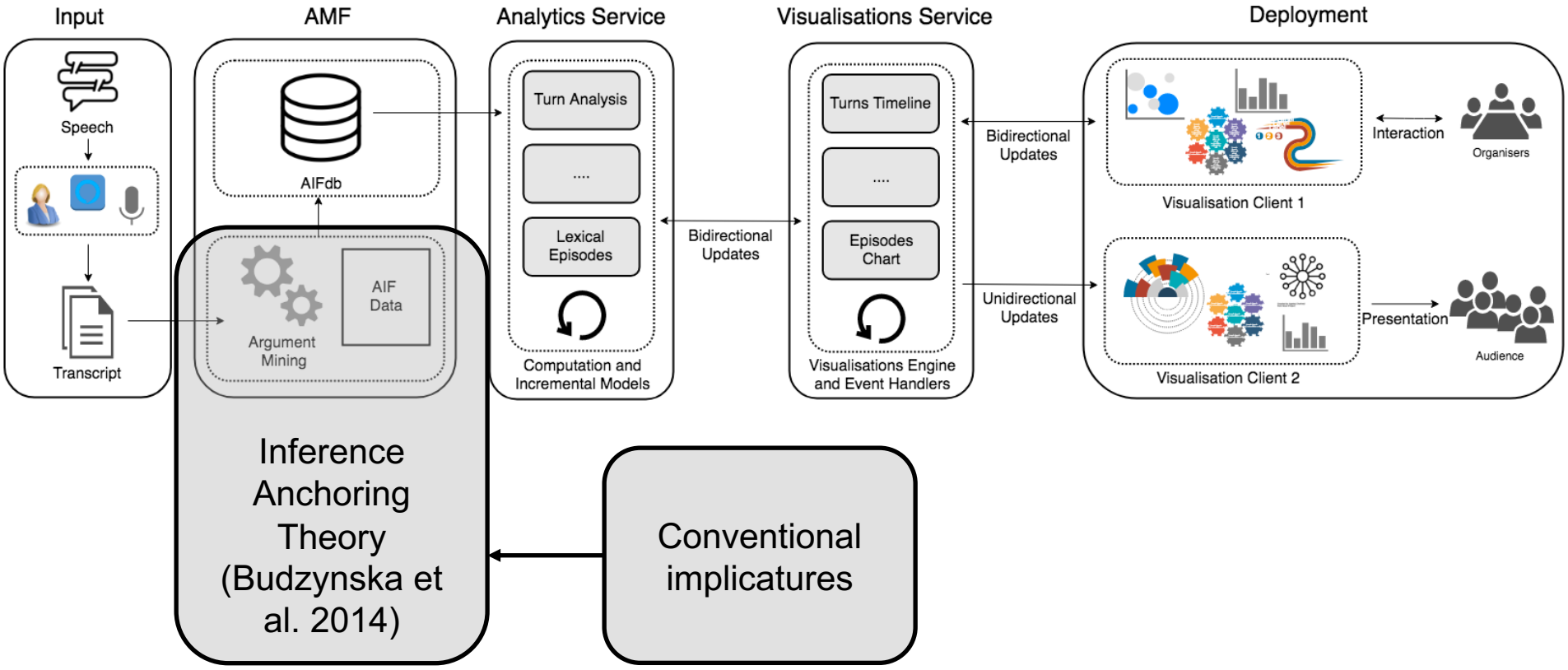
Conflict

Willie winning the tournament is not good — Assertion

[Bob:]
That's not good though.

A. Hautli-Janisz, B. Plüss, K. Budzynska, V. Gold, and C. Reed. 2019. Identifying enthymematic conflict in logos and ethos structures through conventional implicatures. In Proceedings of the European Conference on Argumentation.

The ADD-up pipeline



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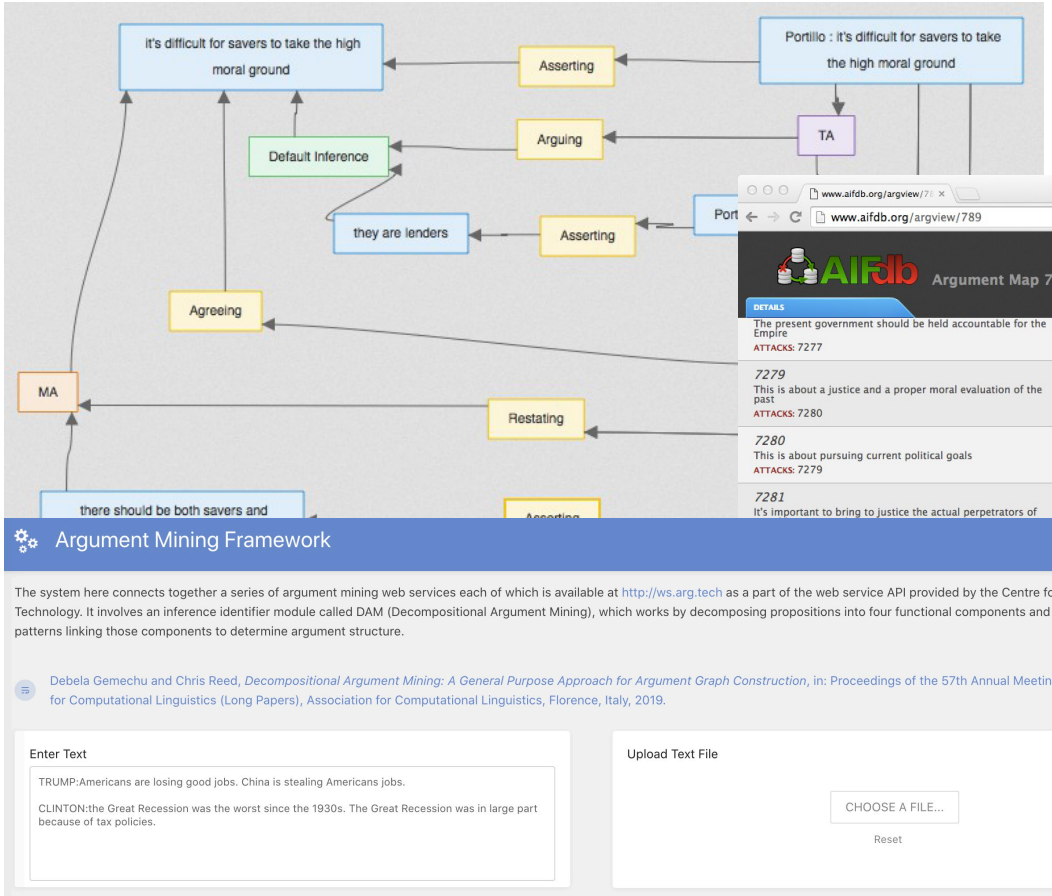
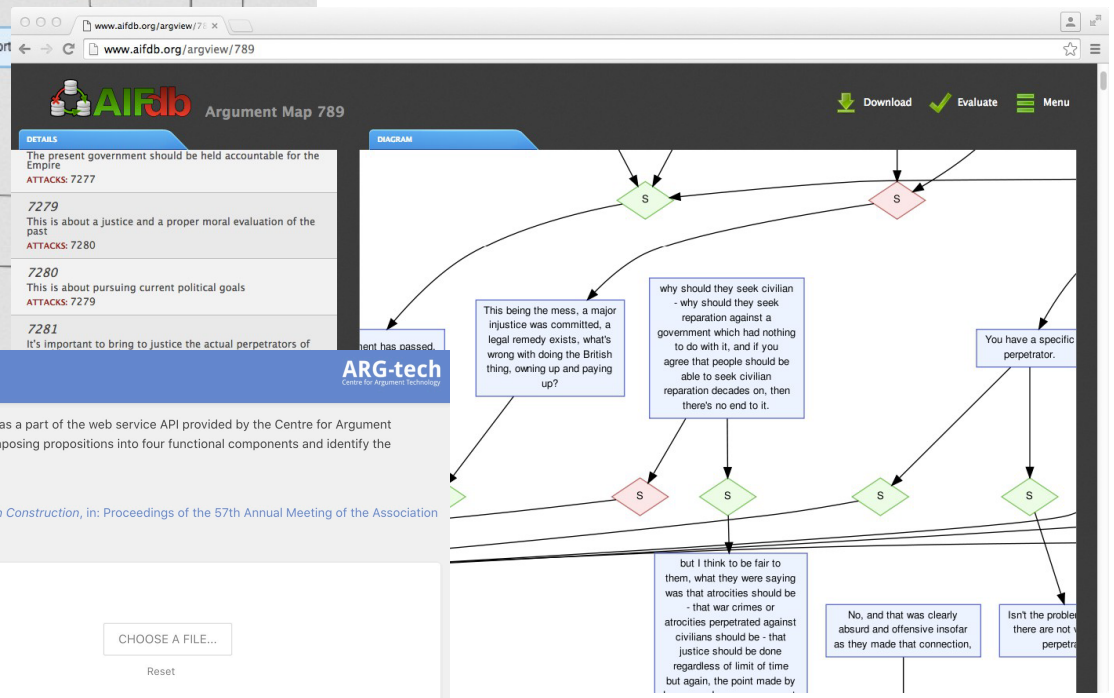
Mining implicit structures: supervised approach



AMF (Gemenchu and Reed, 2019)

CIs in Inference Anchoring Theory (Hautli-Janisz et al. 2019)



AIFdb

A. Hautli-Janisz, B. Plüss, K. Budzynska, V. Gold, and C. Reed. 2019. Identifying enthymematic conflict in logos and ethos structures through conventional implicatures. In Proceedings of the European Conference on Argumentation.

Mining implicit structures: unsupervised approach

Challenge: Indeterminacy of implicit meaning, i.e. the meaning that is implicitly conveyed has no definite or definable value.

(2) *Luckily*, Willie won the pool tournament.

What's the proposition that's conventionally implicated?

- "Willie winning the pool tournament is positive."
- "It is positive that Willie won the pool tournament."
- "It's good that …"
- "It's good for him/us that …"

Hybridization and vectorization.

Insights I

ADD-up: How active do we want the system to be? Merely visual debate representation or automatic intervention to make the deliberation “better”?

- Discussion forum conducted in Dundee: Intervention!
  - Intervene when the debate becomes too emotional.
  - Intervene when people repeat themselves or others.

- Ministry of the Interior Baden-Württemberg, City of Stuttgart: Representation!
  - Don’t have in-room analysis.
  - Web interface with live analysis of the debate, invite comments on individual points.

- Public-facing debate technology: Be flexible.

How can we build trust in debate technology?

Explainability.

“How does an algorithm accomplish what it is accomplishing?”

My previous work: Pair linguistics and NLP with visual analytics.

Explainable AI using Visual Analytics

Use visual analytics to explore the relevance of individual features for classification.

Research question:
Can we automatically determine which deliberative dialogs reach consensus and which do not? Which patterns are crucial for this classification?

Largest corpus of comparable, unconstrained, face-to-face deliberative dialog in German.

Sequential Pattern Mining: Find common, frequent subsequences of discrete symbols (here: discourse-level patterns).

Explainable AI using Visual Analytics

- 42 linguistically-driven features
- Discourse annotation system
  - Disambiguation of explicit linguistic markers
  - Identification of spans and relations in the text

Dimension	Subdimension	Annotation
Argumentation & Justification	Information-giving	speech_act="information_giving" speech_act="information_seeking" speech_act="information_refusing" CI="elucidation"
	Information certainty	epistemic_value="0.01" (impossible) epistemic_value="0.33" (possible) epistemic_value="0.66" (probable) epistemic_value="1" (certain)
	Event modality	event_modality="permission" event_modality="obligation" event_modality="alternative" event_modality="volition" event_modality="reluctance" CI="external_constraint"
	Reason-giving	discrel="reason" discrel="conclusion"
	Common ground	CI="common_ground" CI="activate_common_ground" CI="reject_common_ground"
Accommodation	Agreement	speech_act="agreement" discrel="concession" CI="consensus" CI="minimal_consensus" CI="consensus_willing"
	Disagreement	speech_act="disagreement" discrel="opposition" CI="activate_opposition" CI="contrast" CI="dissent"
	Condition	discrel="condition" discrel="consequence"
	Arguing vs. Bargaining	speech_act="arguing" speech_act="bargaining
Participation	Speaker Capabilities	avg_sentence_complexity="x" CI="stalling"
Atmosphere & Respect	Interruptions	no_of_interruptions="x"
	Politeness	politeness="+" politeness="-" CI="impatience"
	Emotion	emotion="positive" emotion="negative"
	Face Issues	CI="immutable_constraint"

M. El-Assady, **A. Hautli-Janisz**, M. Butt. 2020. Discourse Maps -- Feature Encoding for the Analysis of Verbatim Conversation Transcripts. In Visual Analytics for Linguistics. Stanford: CSLI Publications.
M. El-Assady, **A. Hautli-Janisz**, V. Gold, M. Butt, K. Holzinger and D. Keim. 2017. Interactive Visual Analysis of Transcribed Multi-Party Discourse. In Proceedings of ACL 2017, System Demonstrations, pp. 49-54.
V. Gold, M. El-Assady, **A. Hautli-Janisz**, T. Bögel, C. Rohrdantz, M. Butt, K. Holzinger and D. Keim. 2017. Visual linguistic analysis of political discussions: Measuring deliberative quality. Digital Scholarship in the Humanities, 32(1), pp. 141-158.

Explainable AI using Visual Analytics

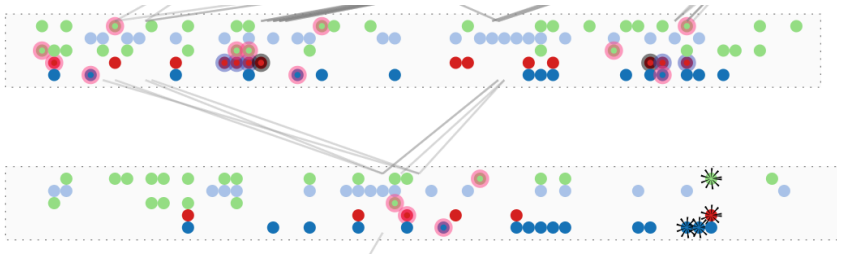
A traditional approach.

Train classifier, “no consensus” versus “consensus”.

Classifier as a “black box”.

Our approach: Human-AI collaboration.

Encode discourse patterns visually.



Integrate the human in the loop.

Adjust the weighting based on integration of **human judgement**.

Enable the detection of new patterns.

Extract discourse patterns (= strategies) for promoting agreement.

Avenues

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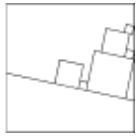

Inequality in Street-Level Bureaucracy: A Computational Linguistic Analysis of Public Service Encounters.

- Excellence Cluster 'Politics of Inequality', University of Konstanz
- Joint project with Steffen Eckhard (PolSci)
- April 2020 - December 2021

Computational analysis of rhetorical strategies and dialogical moves in bureaucratic, face-to-face dialog.

- Study whether systematic differences in communication lead to differences in client satisfaction
- Ultimate aim: eliciting the factors that make public service delivery more equal

Insights II

- Mining dialogue structures requires knowledge of linguistic structure.
- Make use of hybrid models: Combine the power of machine learning with the insights gained in formal theoretical frameworks.
- Use Visual Analytics to make sense of large amounts of data.
- Computational rhetoric is fundamental to debate technology.

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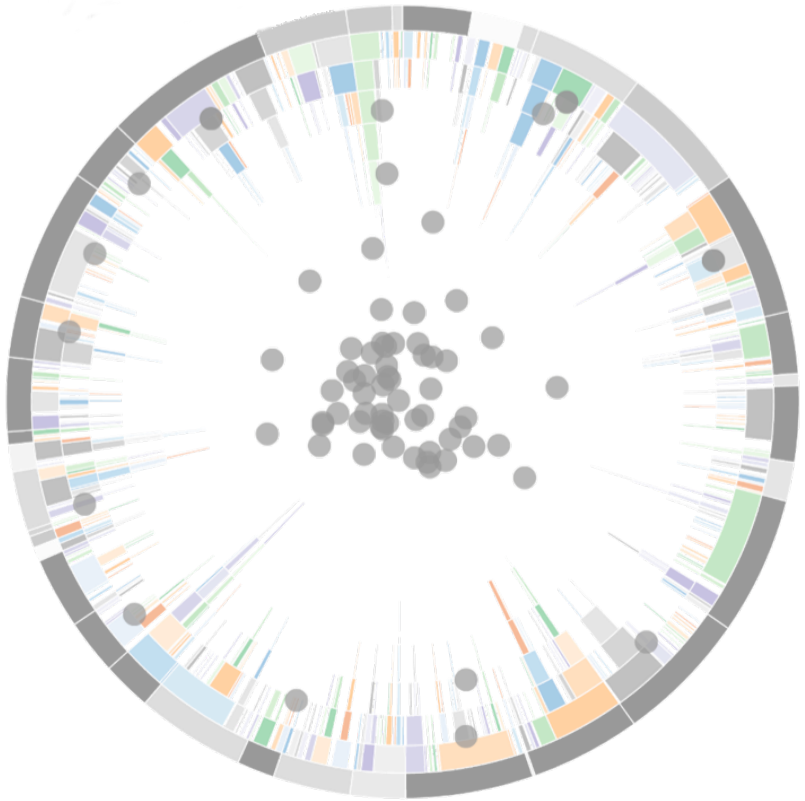
Thank you.
Questions?
Comments?



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