

Comparing Unsupervised Algorithms to Construct Argument Graphs

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<https://recap.uni-trier.de>

Introduction & Motivation

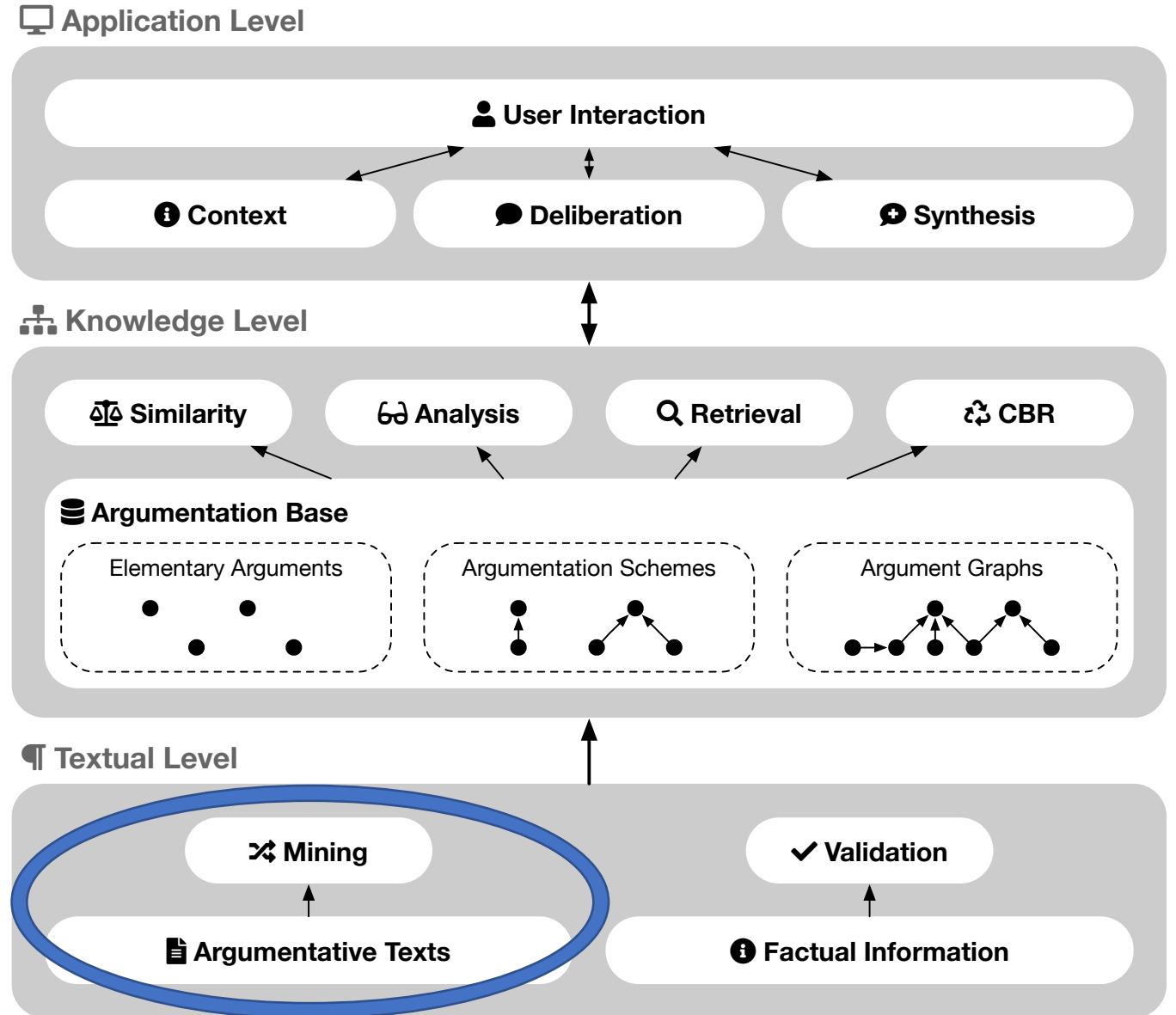
- Argumentation is **omnipresent** in everyday life, so computers should be able to **assist humans** there.
- **Structured argumentation** enables new types of Computational Argumentation (CA) approaches.
- Research on the **automatic creation of argument graphs** is rather limited.
- We propose **four algorithms** that create graphs out text segments.

Overall Project Goals of ReCAP

Develop methods able to...

- **Capture arguments** in a robust and scalable manner.
- **Represent, contextualize, aggregate and reason** with arguments.
- Assist users in working with arguments by specific support for **deliberation and synthesis**.
 - *Deliberation*: Survey about an existing topic.
 - *Synthesis*: Write about a new topic.
- Support **journalists and political scientists**.

Argumentation Machine Architecture



Argument Representation

Plain Text

Rent prices should be limited by a cap when there's a change of tenant. Landlords may want to earn as much as possible, and many, consistent with market principles, are prepared to pay higher rents, but that people with the same income suddenly must pay more and can't live in the same flat anymore seems implausible. Gentrification destroys entire districts and their culture.

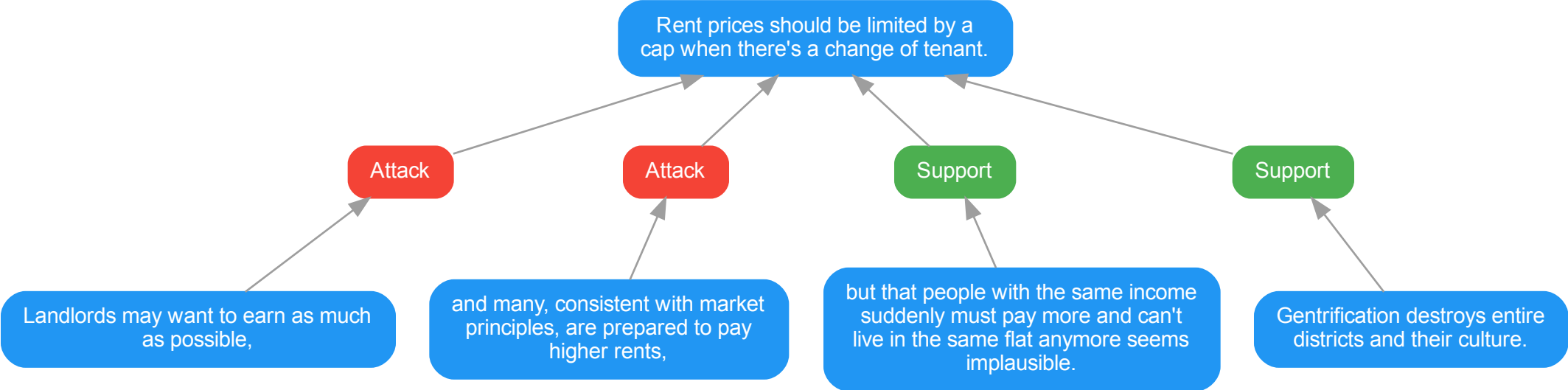
Example from Peldszus and Stede (2016)

Argumentative Discourse Units

Rent prices should be limited by a cap when there's a change of tenant. Landlords may want to earn as much as possible, and many, consistent with market principles, are prepared to pay higher rents, but that people with the same income suddenly must pay more and can't live in the same flat anymore seems implausible. Gentrification destroys entire districts and their culture.

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Argument Graph

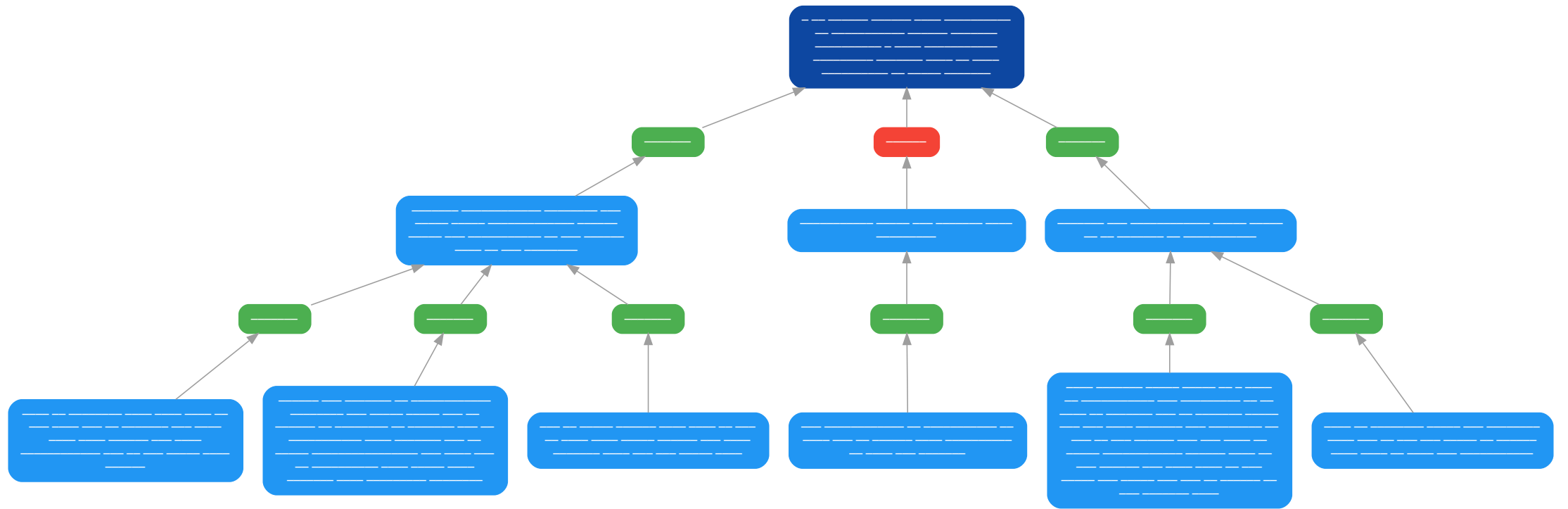


<https://github.com/recap-utr/arguebuf>

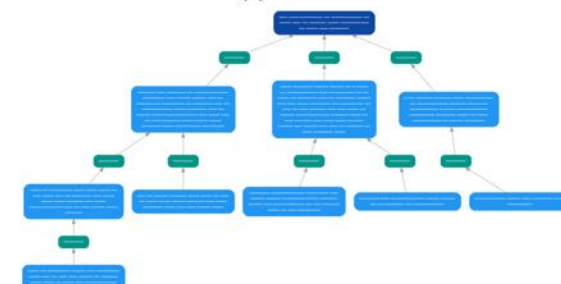
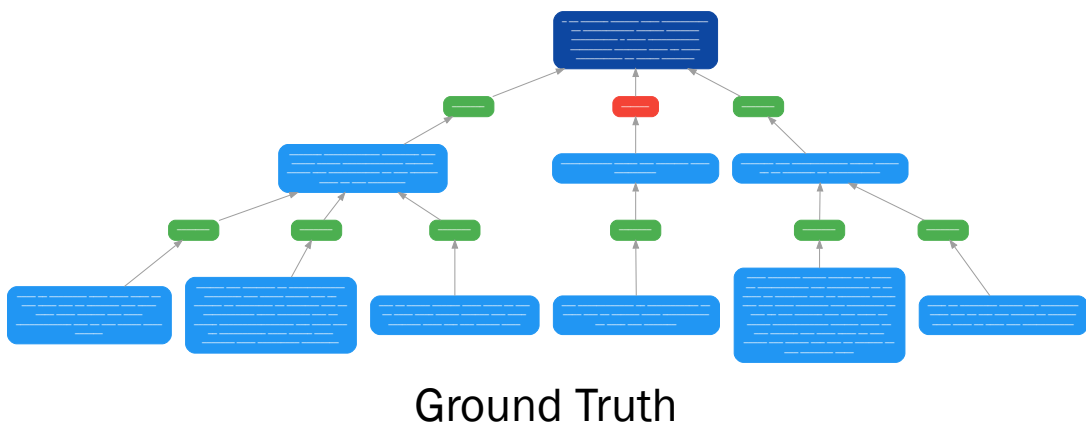
Case Study

For detailed pseudocode of our algorithms, we refer to our paper.

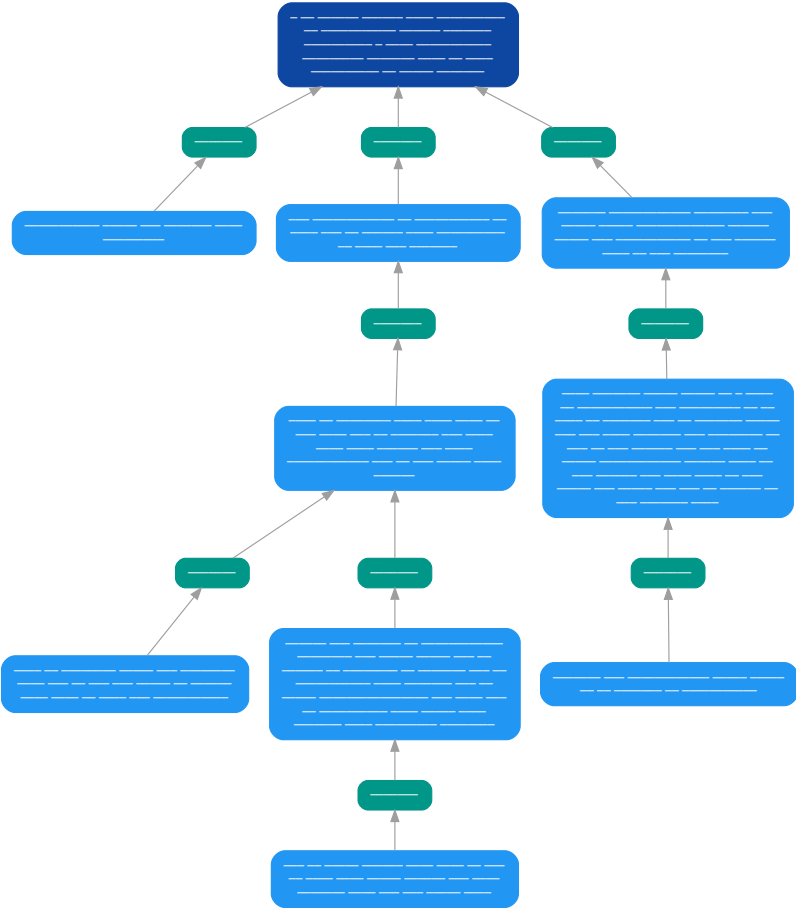
Ground Truth



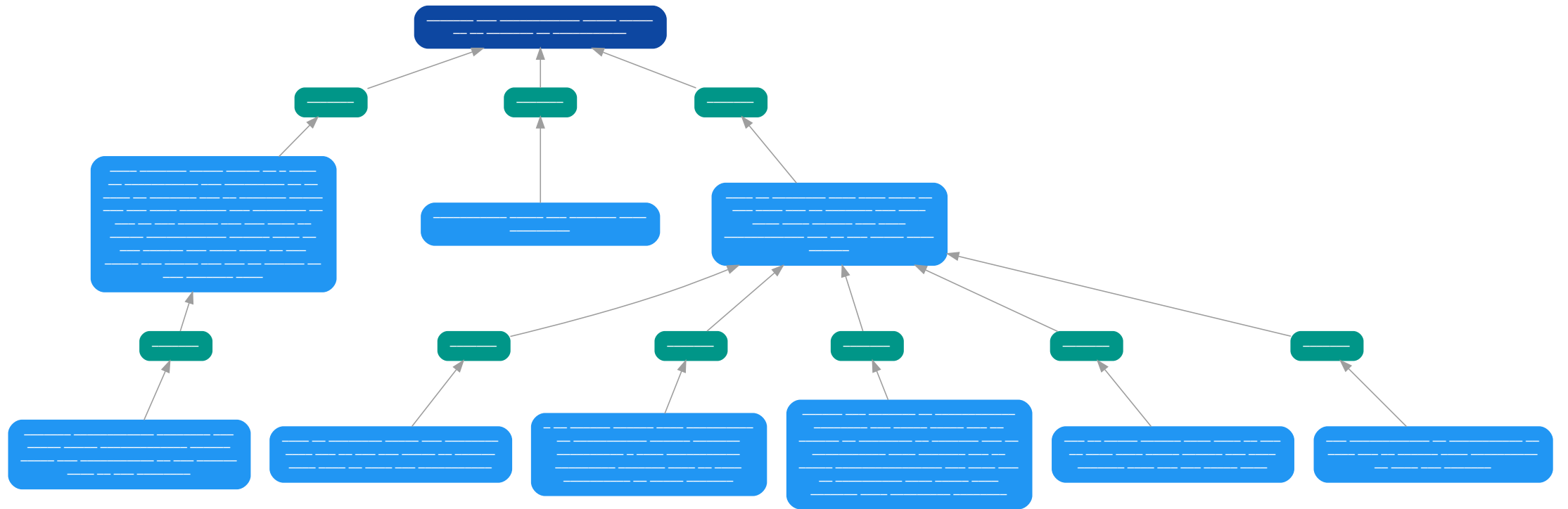
Case Study Overview



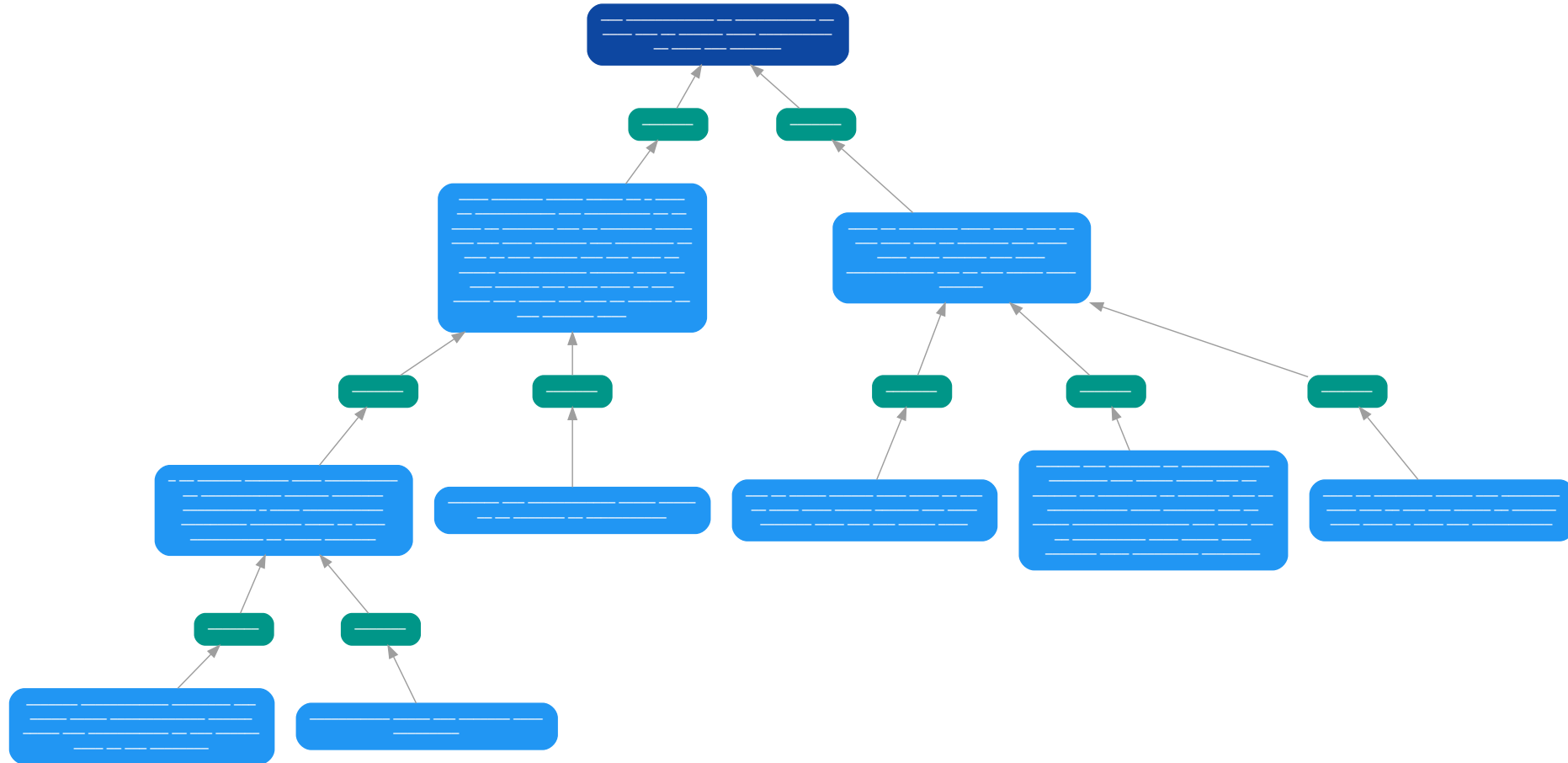
Agglomerative



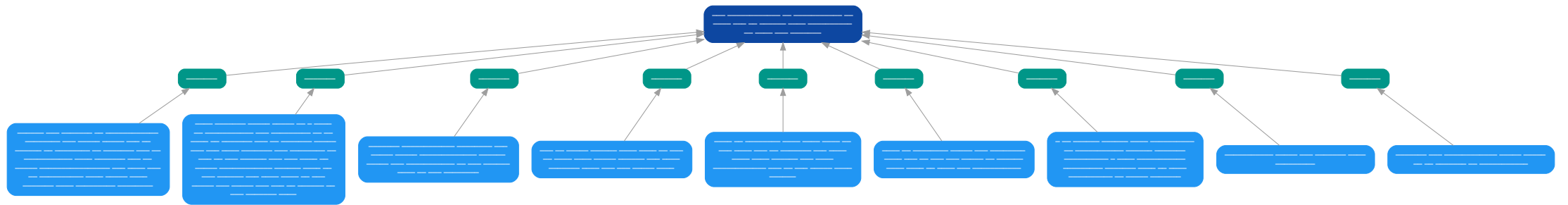
Density



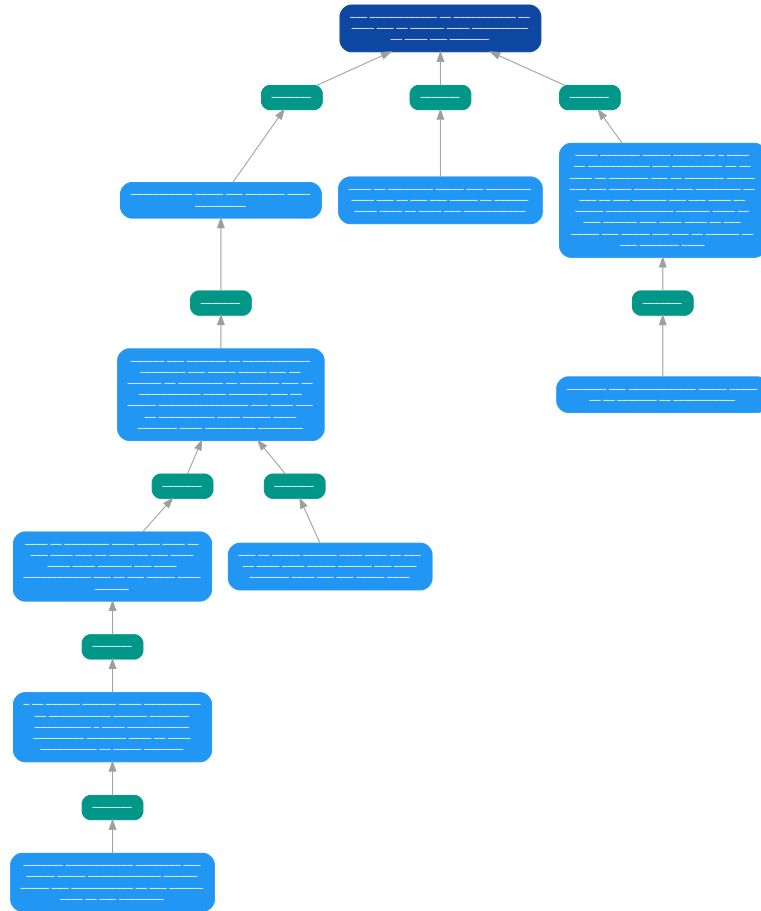
Divide



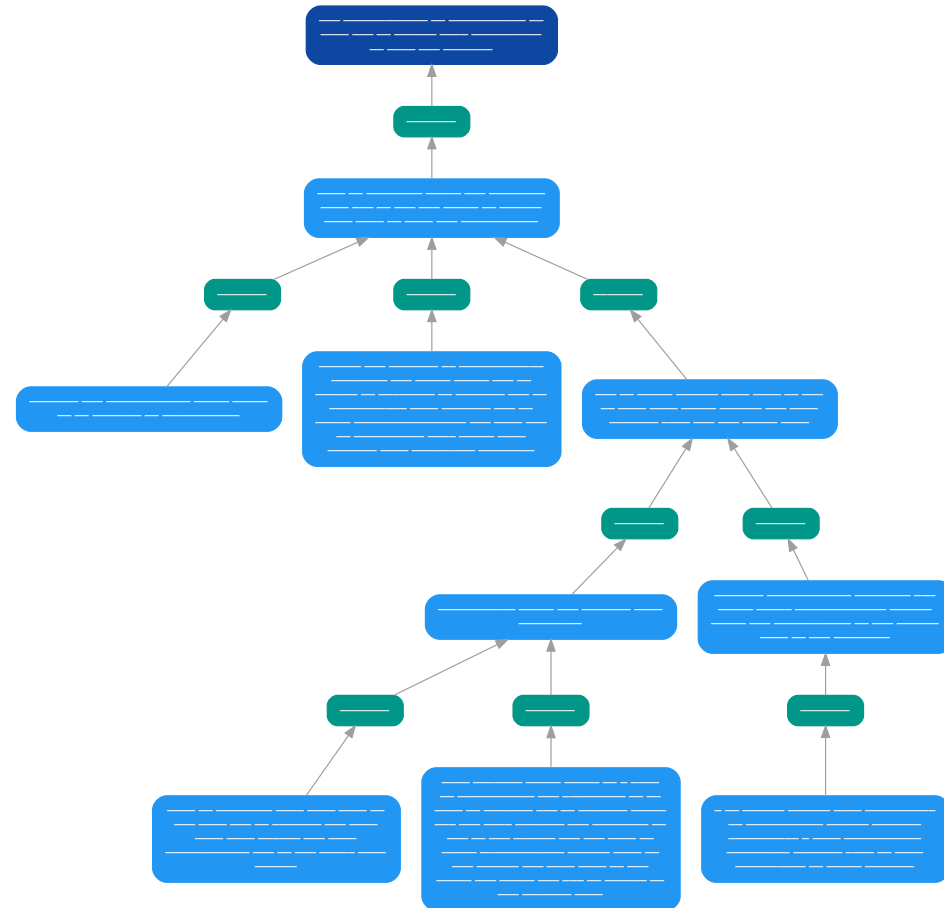
Flat



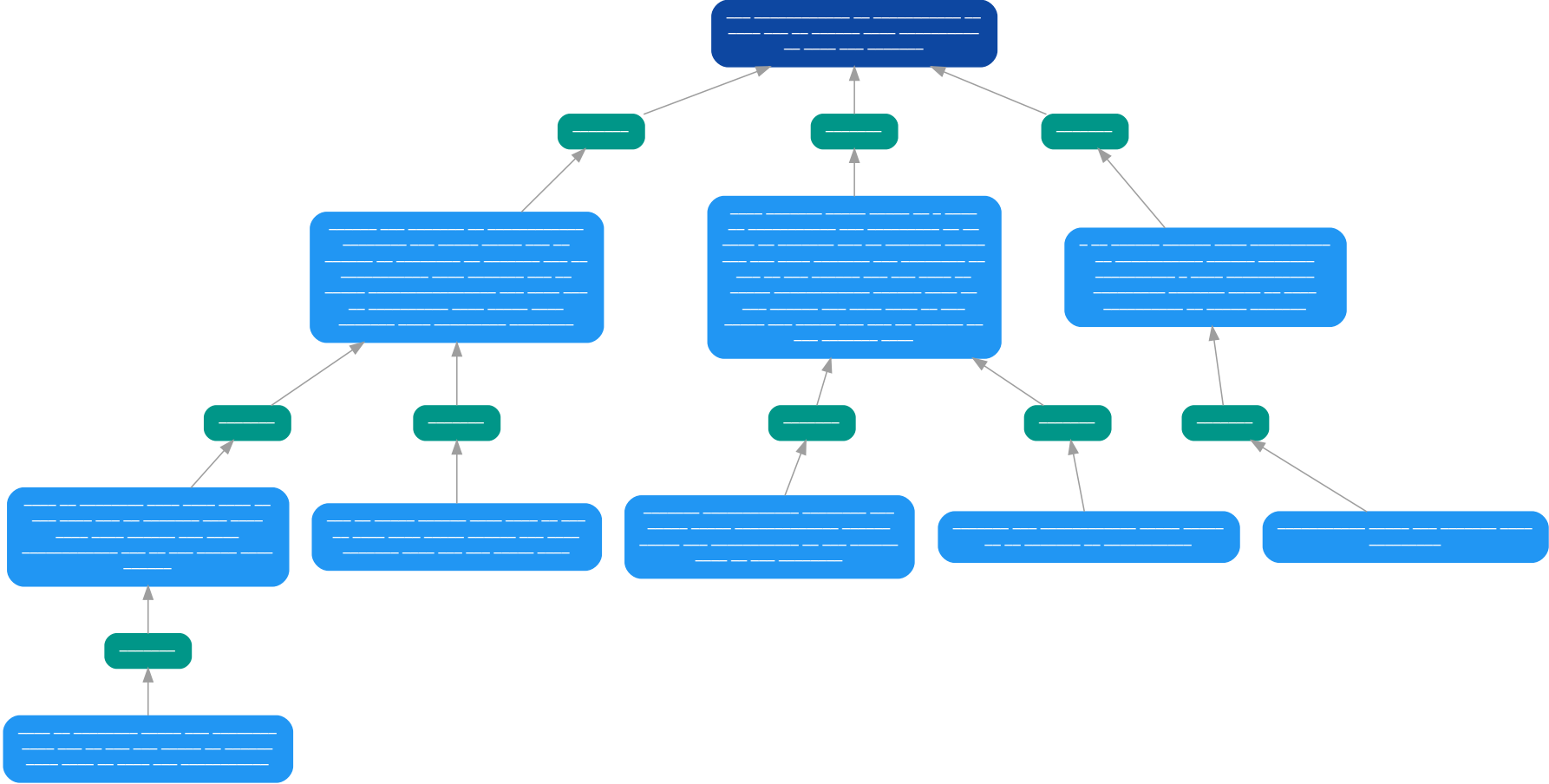
Order



Random



Similarity



Evaluation Results of Case Study

Algorithm	t_{ms}	sim_{edit}	sim_J	sim_{mc}	$\text{sim}_{\text{breadth}}$	$\text{sim}_{\text{depth}}$
AGGLOMERATIVE	5.798	0.579	0.125	1.000	0.822	0.800
DENSITY	4.826	0.632	0.059	0.000	1.000	0.952
DIVIDE	150.204	0.579	0.125	0.000	0.889	0.900
FLAT	0.353	0.684	0.000	0.000	0.556	0.667
ORDER	0.430	0.421	0.059	0.000	0.852	0.800
RANDOM	0.255	0.526	0.000	0.000	0.778	0.714
SIM	0.562	0.395	0.059	0.000	0.944	0.938

Evaluation Results across Datasets

Dataset	Algorithm	t_{ms}	sim _{edit}	sim _J	sim _{mc}	sim _{breadth}	sim _{depth}
Microtexts	AGGLOMERATIVE	0.932	0.755	0.144	0.209	0.807	0.776
	DENSITY	1.576	0.795	0.148	0.209	0.861	0.872
	DIVIDE	38.566	0.741	0.112	0.136	0.816	0.834
	FLAT	0.040	0.830	0.120	0.145	0.862	0.876
	ORDER	0.070	0.745	0.110	0.145	0.826	0.793
	RANDOM	0.043	0.728	0.081	0.045	0.732	0.654
	SIM	0.069	0.748	0.117	0.145	0.857	0.833
Essays	AGGLOMERATIVE	26.261	0.545	0.074	0.264	0.859	0.757
	DENSITY	2.543	0.596	0.057	0.097	0.824	0.830
	DIVIDE	312.668	0.540	0.054	0.241	0.850	0.815
	FLAT	0.053	0.671	0.061	0.236	0.623	0.648
	ORDER	0.165	0.549	0.088	0.236	0.864	0.613
	RANDOM	0.077	0.554	0.041	0.000	0.840	0.750
	SIM	0.422	0.549	0.062	0.236	0.877	0.843
Kialo	AGGLOMERATIVE	1735.590	0.448	0.037	0.011	0.887	0.615
	DENSITY	5.584	0.500	0.022	0.056	0.882	0.826
	DIVIDE	2335.256	0.439	0.022	0.000	0.855	0.699
	FLAT	0.096	0.619	0.010	0.000	0.721	0.577
	ORDER	1.763	0.474	0.073	0.000	0.924	0.363
	RANDOM	0.173	0.448	0.016	0.000	0.895	0.670
	SIM	8.043	0.440	0.028	0.000	0.906	0.752

Conclusion & Future Work

Conclusion & Future Work

- We successfully implemented multiple algorithms that deliver **diverse graphs** as an output.
- **Objective evaluation** of this process continues to be a problem.
- **Density** seems to be the most promising candidate due to it producing rather consistent results for different corpora.
- **Future work:**
 - Assess the impact that multiple graphs of the same argument may have on a user's **understandability** of it.
 - Improve the critical step of detecting the **major claim**.

Thank you for your attention!

We are happy for your questions and/or feedback.