

# From Argument Mapping to Argument Mining, and Back

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Arguments cut across the core of our group’s research, from the development of software tools to assist argument mapping and visualisation, like Compendium<sup>1</sup>, Cohere<sup>2</sup> (Buckingham Shum, 2003; 2008) and the Evidence Hub<sup>3</sup> (De Liddo and Buckingham Shum, 2013), to more recent applications in citizen engagement for social innovation<sup>4</sup> (De Liddo and Buckingham Shum, 2010; Buckingham Shum et al., 2014) and collective sensemaking of contested knowledge (De Liddo, et al., 2012).

Our work has focused on the modelling and visualization of everyday argumentation processes, and our research studies the user experience from untrained first-time users, to expert facilitators. All of our tools are designed to support the construction and visualization of dialogue and debate as a means to facilitate access to and understanding of complex, “wicked problems”. Initially, argument modelling and mapping was approached as a fundamentally human task, and as is well known in argument modelling, the construction of well-formed arguments from conventional prose requires considerable effort and expertise, posing a user experience design challenge.

## **Human and Machine annotation for Collective Sensemaking**

We have therefore begun to explore a mixed human-machine annotation approach, by integrating the Xerox Incremental Parser (XIP) into Cohere. XIP is a NLP tool, which includes a ‘salient sentences’ rhetorical parser designed originally for automatic analysis of academic publications. This has been shown to be able to identify metadiscourse signifying rhetorical moves such as claims around *novelty*, *contrast*, *summary*, *background knowledge*, and *open questions*. Our work used XIP to parse a project report dataset to automatically extract salient parts of the text and suggest possible argument annotations. Cohere was in parallel used to support human annotation of the documents and to visualize human-machine annotations. The study compared XIP annotations with the human annotations of contrasting ideas and rhetorical moves, and demonstrated promising overlaps between the two (De Liddo et al., 2012). This project also demonstrated how XIP’s output could be integrated with human annotation in a range of different visualizations, illustrating the mapping/mining synergy that we are convinced will be required for successful computer-supported argumentation at scale. This was a first step into exploring the use of NLP tools for arguments seeding in human-centered platforms for collective argumentation.

## **Learning analytics for Academic writing**

This research is now being extended to investigate its potential for student reflective reading and academic writing, the hallmarks of which are one’s ability to make critical thinking visible. We are applying XIP to student writing, and seeking to validate this against educational criteria such as grade, and educational marking rubrics. Moreover, we are again seeking to devise visual analytics which make XIP’s output intelligible to non educators and students (Simsek et al., 2013).

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<sup>1</sup> [compendiuminstitute.net](http://compendiuminstitute.net)

<sup>2</sup> [cohere.open.ac.uk](http://cohere.open.ac.uk)

<sup>3</sup> [evidence-hub.net](http://evidence-hub.net)

<sup>4</sup> [catalyst-fp7.eu](http://catalyst-fp7.eu)

## Citizen Engagement in Televised Election Debates

We envision further applications in the area of citizen engagement in social innovation and policy making. We have recently launched the EPSRC Electoral Debate Visualisation (EDV) Project<sup>5</sup>, aimed at developing an online video replay platform during the 2015 UK General Election, in which party leadership debates are linked to customisable visualisation channels to enhance viewers' experience and hopefully encourage citizen engagement in televised political debates.

From a series of focus groups carried out by our partners in political communication at the University of Leeds, it emerged, for instance, that voters often feel confused by the communication strategies of political leaders. Argument maps are one possible input into visualization channels that could help viewers address the concern. Arguments can be produced manually using Compendium's video mapping features, semi-automatically by parsing the transcripts with XIP or the technique described next, and perhaps in collaboration with argument mining colleagues, fully automatically. Our architecture will support the visualization of different analytics output in separate 'channels' synchronized with the debate videos. A novel modelling and visualization approach we have developed is based on an analysis of the candidates' rhetoric to detect instances in which they fail to obey the rules of the game for political debates (Plüss, 2010; 2013). This is analogous to detecting fallacies in natural argumentation and would allow viewers to "see", for instance, when a politician is failing to answer a question or purposefully making a "soundbite" remark. This is currently a semi-automated process, depending on human annotation prior to automated analysis: an open question for argument mining research is whether further automation is possible.

## Social Media Mining for Critical Engagement in Political Debates

Preliminary plans for future research include collaboration with colleagues working on information retrieval and sentiment analysis at KMi to build online tools for assisting citizens in making sense of political dynamics around more general political agendas<sup>6</sup>. This challenge involves extracting arguments from social and online media and presenting them in ways that are tailored to a citizen's interests and needs. One question, for instance, is whether it would be possible to extract arguments, manually, semi- or fully automatically, from Twitter streams with the linguistic restrictions they normally have. Further, we would be interested in extracting arguments from published media, such as newspapers, blog posts or party policy documents and automatically link social media contributions to these arguments. This would allow for instance that a citizen interested in a particular idea, debate or controversy could retrieve the political actors that align with the different positions.

## References

- Buckingham Shum S. (2003) **The Roots of Computer-Supported Argument Visualization**. In: Kirschner P.A., Buckingham Shum S. and Carr C. (eds) *Visualizing Argumentation: Software Tools for Collaborative and Educational Sense Making*. London: Springer-Verlag, 3-24.
- Buckingham Shum S. (2008) **Cohere: Towards Web 2.0 Argumentation**. *Proceedings of the 2nd International Conference on Computational Models of Argument*. 28-30 May 2008, Toulouse, France.
- Buckingham Shum S., De Liddo A., Klein M. (2014). **DCLA Meet CIDA: Collective Intelligence Deliberation Analytics**. *2nd International Workshop on Discourse-Centric Learning Analytics, LAK14: 4th International Conference on Learning Analytics & Knowledge*. 24-28 March 2014, Indianapolis, USA.

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<sup>5</sup> [edv-project.net](http://edv-project.net)

<sup>6</sup> [sense4us.eu](http://sense4us.eu)

De Liddo A. and Buckingham Shum S. (2010) **Capturing and Representing Deliberation in Participatory Planning Practices**. In: De Cindio F., Macintosh A. and Peraboni C. (eds) *Fourth International Conference on Online Deliberation*. Leeds, UK.

De Liddo A., Sándor Á. and Buckingham Shum S. (2012) **Contested Collective Intelligence: Rationale, Technologies, and a Human-Machine Annotation Study**. (CSCW), 21(4-5) pp. 417–448.

De Liddo A. and Buckingham Shum S. (2013). **The Evidence Hub: harnessing the collective intelligence of communities to build evidence-based knowledge**. In: *Large Scale Ideation and Deliberation Workshop*, 29 June – 02 July 2013, Munich, Germany.

Plüss B. (2013). **A Computational Model of Non-Cooperation in Natural Language Dialogue**. PhD Thesis. The Open University.

Plüss B. (2010). **Non-cooperation in dialogue**. In: *Proceedings of the Student Research Workshop at the 48th Annual Meeting of the Association for Computational Linguistics*, 11-16 July 2010, Uppsala, Sweden.

Simsek D., Buckingham Shum S., Sándor Á., De Liddo A. and Ferguson R. (2013). **XIP Dashboard: Visual Analytics from Automated Rhetorical Parsing of Scientific Metadiscourse**. In: *1st International Workshop on Discourse-Centric Learning Analytics*, 8 Apr 2013, Leuven, Belgium.