Large-Scale Deployment
of Argument Analytics

Chris REED [a,1], Katarzyna BUDZYNSKA [b,a], John LAWRENCE [a],
Martín PEREIRA-FARIÑA [a], Dominic DE FRANCO [a], Rory DUTHIE [a],
Marcin KOSZOWY [b], Alison PEASE [a], Brian PLÜSS [a], Mark SNAITH [a],
Debela TESFAYE [a] and Jacky VISSER [a]

[a] *Centre for Argument Technology, University of Dundee, United Kingdom*
[b] *Institute of Philosophy and Sociology, Polish Academy of Sciences, Poland*

Abstract. Radio and television programmes, which broadcast discussions on societally important topics such as immigration or nuclear disarmament, are essential sources of information about different views on these topics which the general public can use to help form their opinions. This paper proposes Argument Analytics, sense-making argument technology, developed and deployed to provide an insight into such debates for a large audience by visualising metrics such as *like-mindedness* (similarity or differences in views of individual participants of the debate) and *divisive issues* (issues attracting the highest number of supports and attacks).

Keywords. argument technology, argument visualisation, corpus resources, real-world application

Building upon a preliminary research tool [7], we introduce Argument Analytics – a scaled-up argument technology presented to a large, non-expert audience in a real environment. Unlike many visualisation tools for argumentation which support diagramming reasoning structure (e.g. Carneades [4], Rationale [10]) or evaluating argument acceptability [9,3], our tool offers infographics, i.e. graphic visualisations of argument and debate presented as a clear and intuitive overview.

In 2017, Argument Analytics was developed and deployed in partnership with the BBC, providing a set of analytics (metrics) for the BBC Radio 4 programme, *Moral Maze* (`bbc.co.uk/programmes/b006qk11`). We worked with two episodes from 2012 and 2017 on the morality of abortion. In order to release Argument Analytics in real-time, i.e. at the same time as the 2017 episode was broadcast, the programme was pre-recorded allowing us to run the whole process of preparing Argument Analytics in the 48 hours before broadcast. This required the development of a detailed plan and robust process with the work divided into two teams: the Analysis Stream and the Tech Stream.

Argument Analytics computes metrics using the properties of graph-based argument networks [8]. In an 8 hour time window, the Analysis Stream aimed to annotate an episode using OVA+ [5] and an annotation scheme built upon Inference Anchoring Theory, IAT [2] (`arg.tech/iatguidelines`). Because of several challenges, including time-constraints and inexperienced members of Argument Analysis Team, AAT, we de-

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Figure 1. Two analytics: like-mindedness (on the left) and divisive issues (on the right).

veloped a multi-layered annotation process (see [1] for more details): (*i*) *Basic Annotation Layer*: a standard corpus linguistic procedure; (*ii*) *Quality Assessing*: discussing the argument maps in pairs for agreement; (*iii*) *Check-List*: comparing maps against an IAT check-list; and (*iv*) *Gate Keeping*: final corrections by the two most experienced analysts.

Building on previous Argument Analytics development, back-end web services were developed to take a specific timeslice of data from AIFdb [6] and perform the computationally intensive calculations required to extract the specific results and accompanying text for each metric. Front-end display modules were developed to take this output and render the graphics using a range of web technologies including SVG, HTML5 canvas and Javascript which allow for rapid customisation of the visual display. Each analytic was then captured as a static image file to ensure consistency of visual presentation, as well as to decrease server load and improve response times. The Tech Stream was also tasked with carrying out a qualitative focus group study, the results of which included a ranking of preference for analytics, allowing us to narrow the range to those which were most informative, as well as the generation of specific design suggestions.

As a result, Argument Analytics offered the following infrographics published at `bbc.co.uk/programmes/p05jp46h/p05jp4p1` and `bbc.arg.tech`: *like-mindedness* and *divisive issues* described in the abstract above and visualised in Figure 1; *debate cogency* showing how well supported the claims are; *central issues* visualising the topics weighted by the centrality of their associated nodes in the argument graph; *turns timeline* detailing who was speaking when; *conflict hotspot timeline* showing the proportion of conflicts in 1-minute time windows; and *interactions* describing the proportion of a participant's interchange with each of the others. These analytics were generated for seven different *time slices*, providing an overview of the evolution of the debate, also available in *comparative mode* between the 2012 and 2017 episodes.

Argument Analytics helps an audience to make sense of, and obtain insight into, debates on difficult and societally important topics, offering an alternative method to the summaries provided by commentators and pundits, who may or may not have editorial or personal agendas, political biases, or simply spotty knowledge. There is potential for further improvement and extension by generalising the tool for other domains and audiences; replacing manual annotation with argument mining; and evaluating the infographics with the *Moral Maze* audience in more extensive user studies. The large-scale deployment of Argument Analytics attracted a positive response from BBC stakeholders, the general public, and news media, with *The Independent* and *Newsweek* featuring articles on how the argument technology can make a widespread impact on society.

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