Mapping Increasingly Large Networks of Argumentative Inferences

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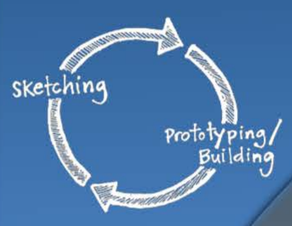
1. Abstract

Argument diagramming has been a popular and important technique over the years for communicating arguments and exploring their underlying structure

Hand-drawn argument diagrams quickly become unwieldy in the space of a dozen or so nodes, computational tools fair little better and are practically useful for visualising argument graphs up to perhaps fifty nodes.

However, with the promise of vast, web-scale databases of analysed argument structure containing hundreds, if not thousands of nodes enabling the arguments covering entire topics to be surveyed and explored, it is apparent that improved tools for visually exploring these datasets are required.



2. Related Work

Indentation layout

(+) It shows the hierarchy structure of the arguments
(-) It fails to provide an overview of the whole structure of the arguments
(-) It can be overwhelming for the users to get specific data due to the expanders

Node-link layout

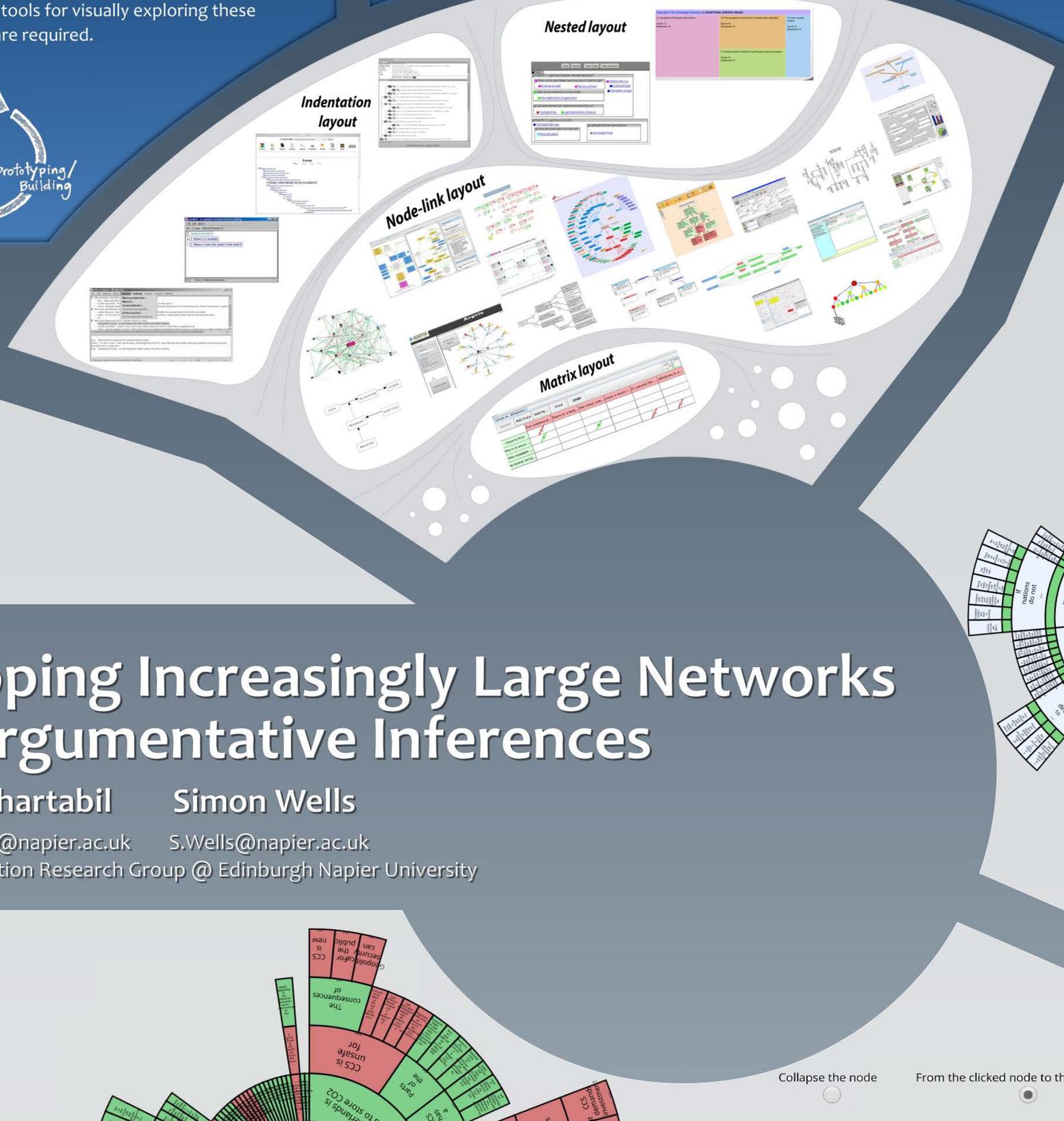
(+) It presents the argument structure and the relations between arguments' elements
(-) It becomes space-inefficient when the number of nodes increases

Nested layout

(+) It overcomes the wasted space in the node-link layout.
(-) It is hard to understand the type of relations between the nodes.

Matrix layout

(+) It makes the argument's relations explicit.
(-) It is not easy to follow a given path to help to understand the related debate.



3. User Requirements

Studies with argumentation diagram users have uncovered the following requirements:

(a) To explore the logic flow of the premises and how they are connected to the main topic of the argument and with each other.

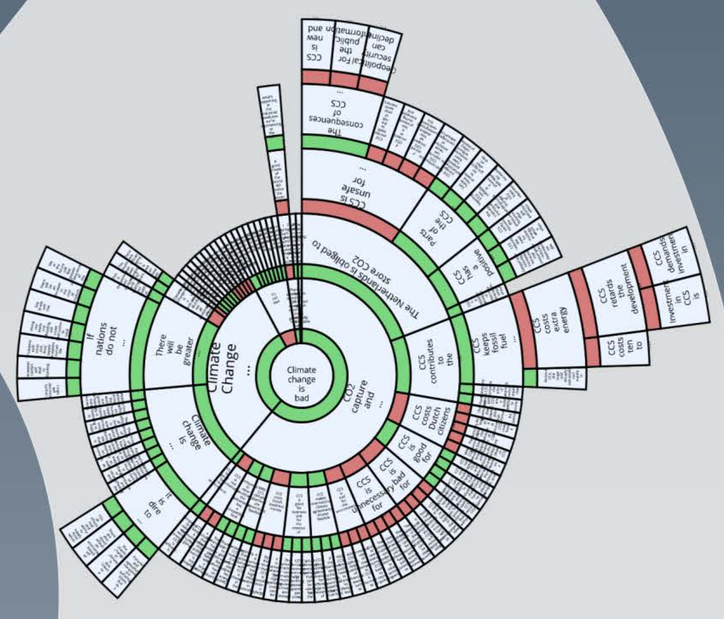
(b) To present the entire argument, all at once, in the proper order making the reasoning structure explicit.

(c) To collapse unnecessary parts of the map to focus on the parts that they think are more important.

(d) To search for the keywords or the expressions that they are interested in.

(e) To save and share the arguments' graphs with others.

If you are interested in **improving argument visualisation** to meet the **challenges of large datasets** and would like to contribute please contact **Dana [D.Khartabil@napier.ac.uk]** or speak to her today.



4. Visualisation Design

Radial layouts help to provide an **overview** that shows the complete structure of argument data to build a **mental map** and explore the most **contrast/support** ideas.

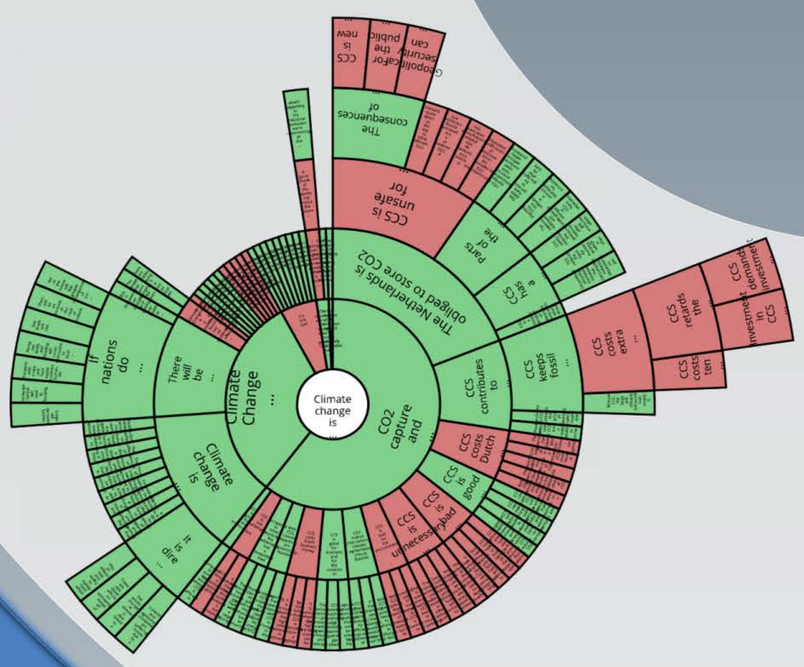
The **main conclusion** of the argument is located in the **centre** of the radial surrounded by other related nodes.

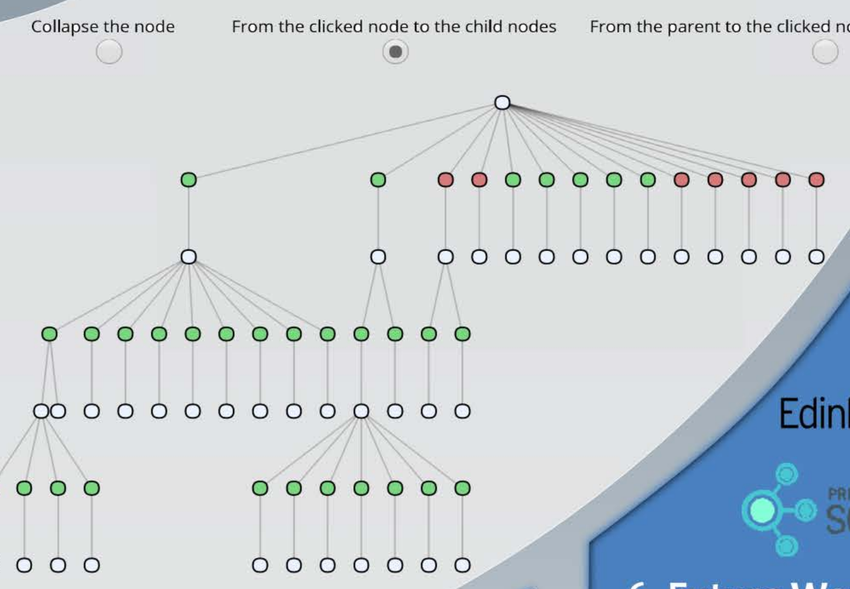
The **information nodes** are visualised as **sectors** with statements expressed inside each sector.

The **colour encoding** of the information nodes represents the **schema nodes**, reflecting the relations between the information nodes. Red denotes a **contrast** relation while green denotes a **support** one.

To avoid presenting the whole text of the information nodes and thus occupying a large space, the font size is chosen to be proportional to the node's size and long **texts are punctuated** to avoid label overlap.

In the revised design, the radial layout is modified to include two types of node: information nodes and schema node.





5. Conclusions

- We have proposed a **new argument visualisation tool** to present **large-scale arguments**.
- Compared with other widely used views, the tool demonstrated **a better utilisation of the visualisation area** and maintained a **readable map** when applied on **large-scale argument** dataset.
- It is especially useful for researchers working in the **analysis of complex problems** whether they are social, medical, health, or natural ones.

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6. Future Work

Our future work will focus on fulfilling all users' requirements in terms of the creation of an interactive map that helps in understanding complex problems and the related discussions.

Our tool will be evaluated using feedback from experts and regular users.

The interviews with the experts will help in indicating the degree of satisfaction of the users in implementing their requirements and further improve the tool.