

ACH-Nav: Argument Navigation Using Techniques for Intelligence Analysis

Dimitra ZOGRAFISTOU^{a,1}, Jacky VISSER^a, John LAWRENCE^a and Chris REED^a

^aCentre for Argument Technology, University of Dundee, UK

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Structured analytic techniques have been established as a powerful weapon in the arsenal of Intelligence Analysis that helps mitigating confirmation bias - arguably one of the most well-known yet still most pernicious cognitive biases [1], by offering systematic processes to conduct the analyses. One of the most widely implemented techniques is the Analysis of Competing Hypotheses (ACH) [2]. As with all structured analytical techniques, ACH is simple in its core idea: first, generate hypotheses that explain some particular event or series of events (there are other structured techniques for such generation); tabulate the working hypotheses; then cross those with the different items of evidence and assumption; finally for each cell in the table – each combination of hypothesis and evidence – analyse the extent to which the evidence is consistent with the hypothesis.

Argumentation is another approach that has increasingly gained traction in the Intelligence Community. Argument mapping, for instance, is a common Structured Analytical Technique [3], and abstract argumentation frameworks [4] have recently been explored as a way of identifying the most valuable or critical items in intelligence analyses [5]. An argument graph of a full-blown intelligence case can, however, very rapidly expand to hundreds of nodes, making it difficult for an analyst to track or make sense of.

To address this challenge, we develop a software tool, called *ACH-Nav*², which is an argument visualisation and navigation tool designed specifically to support decision-making and sense-making into large volumes of data in the domain of Intelligence Analysis. The tool offers a navigation framework which is built around the concepts and reasoning of ACH, making the navigation process directly understandable to intelligence analysts, by virtue of their familiarity with the method. It is based on the ArgNav tool³, the goal of which was to provide the capability to navigate within large volumes of argument structures but in the general domain [6].

For an ACH-driven argument navigation, central concept is *hypothesis*. In the argument graph, the user can easily identify which propositional nodes are hypotheses and is provided with options to unfold related information, including consistent and inconsistent evidence or alternative hypotheses, by identifying the corresponding structural patterns around them. From these structures, the equivalent ACH matrix can be reconstructed. Thus, the main interface of *ACH-Nav* consists of two main views of the data,

¹Corresponding Author: Dimitra Zografistou, Centre for Argument Technology, University of Dundee, UK; E-mail: dzografistou001@dundee.ac.uk

²Website: <http://achnav.arg.tech/>; Github repository: <https://github.com/arg-tech/ACH-ArgNav>

³<https://argnav.arg.tech/>

the *Argument map view* and the *ACH view* and gives the options to switch between them while maintaining focus on specific nodes. Additionally, from the ACH view, the tool allows to instantly uncover the reasoning chain that leads to a hypothesis, by hovering over the corresponding cell that includes this hypothesis. All this functionality is built on the mapping between ACH and argumentation expressed in the Argument Interchange Format (AIF) [7]. Figure 1 gives a screenshot of the ACH view.

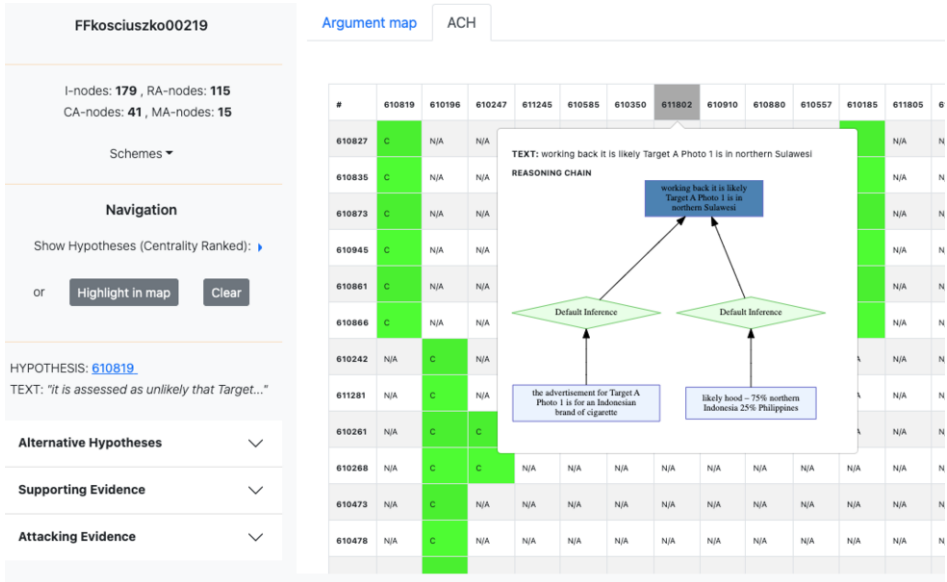


Figure 1. ACH-Nav: ACH view of the data

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