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"Probabilistic Visualization of Complex Arguments
to Resolve Analytic Disagreements"

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Clarity: Software for Resolving Disagreements

- My IC postdoc research: collaborative Bayesian software to help intelligence analysts resolve disagreements.

- This includes disagreements about:
  - Appropriate conclusion(s) and its implications
  - Strength of evidence
  - Probabilities assigned to evidence
  - Likelihood ratios
  - Strength of statistical dependence between items of evidence

Clarity: Software for Resolving Disagreements

- Clarity will help analysts resolve such disagreements by producing probabilistic visualizations of arguments to locate the source(s) of such disagreements.

- Clarity will involve expert elicitation and dialogue and provide a largely non-AI means of assessing and improving evidence and reasoning.

- A major part of my research will be independent empirical validation of Clarity.

- See [here](#) for my IC Postdoc proposal for Clarity.

Intelligence Issues Are Bayesian Issues

- Intelligence reports generally have some sort of implicit Bayesian reasoning structure (broadly construed).

  - Sometimes <u>precise</u> numerical probabilities

  - More often, (very) <u>imprecise</u> numerical probabilities

  - Sometimes probabilistic judgments are merely <u>qualitative</u>

- Clarity will elicit, score, and thereby improve analysts' probabilistic reasoning.

Preliminaries for any REASON System

- Before any Task Areas (TAs) can be done, REASON must identify:
  - The <u>conclusion</u>(s) of the report.
  - The information the analyst takes to be <u>relevant</u> to the strength of the conclusion.
  - The evidence the analyst takes to <u>support/undermine</u> the conclusion.
  - The <u>strength</u> the analyst takes the evidence to support/undermine the conclusion.

Using *Clarity* to Assess a REASON System

- Each of the these preliminaries will be enabled by Clarity and will be required by REASON.
  - Clarity will do this using expert elicitation.
  - REASON will do this using AI—not expert elicitation.
  - So, Clarity cannot by itself be a part of any REASON Performer's system.
- However, *Clarity* will provide a Performer a rapid means of reliably assessing how well its REASON system works for the TAs.
- Its ongoing assessments will guide the Performer to improve its REASON system.

Clarity, IARPA's T&E, and a Performer's Testing Its Own System

- IARPA has a rigorous program of Test and Evaluation (T&E) of the Performer systems.

- Every performer also needs its own rigorous, rapid feedback testing system.
  - This will determine how well each part of its system is working and where improvements are needed.

- *Clarity* could be a key part of a Performer's own T&E system, providing assessments of:
  - The evidence and reasoning in the analyst's original draft
  - The quality of the Performer's outputs to the TAs.

Further Information

My IC postdoc proposal describing Clarity is here.

Given the rapid improvements in natural language software since I submitted the proposal, Clarity will include some version of ChatGPT. As ChatGPT will become even better in the next few years (GPT-4 is due later this year), the final version of Clarity will be expert elicitation software that is supplemented by AI.

At present, there is no AI method to create even simple non-Bayesian argument maps, much less create maps that capture the complexity of real-world arguments (which invariably involve probabilistic judgments). Perhaps the ongoing strides in AI will provide a means of producing non-Bayesian argument maps. However, even if this occurs, it is far from clear how present approaches to NLP can provide the prior probabilities and likelihoods necessary for Bayesian argument maps. So, even if REASON succeeds, it appears that something like Clarity should have a key role in the IC.

Mindmup is the collaborative, non-Bayesian argument mapping software that will be integrated into Clarity:
https://www.mindmup.com/

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