Cognitive Agent for Rapid Explanation, Analysis, and Sourcing Online (Cogent REASON)

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The prevailing approach to the development of knowledge-based agents is through knowledge acquisition from a subject matter expert and representing this knowledge into the agent’s knowledge base, which is a form of programming. This is a long, difficult, and error-prone process.

Agent Instruction researches the development of agents through teaching them as we teach students, rather than programming them.


Intelligence Analysis


Humans are slow, sloppy, forgetful, implicit, and subjective but have common sense, have intuition, and may find creative solutions in new situations. Agents are fast, rigorous, precise, explicit, and objective, but have poor ability to deal with new situations, lack common sense and intuition.

Enables mixed-initiative integration of the complementary reasoning capabilities of analysts (including imagination and expertise) and computer agents (including knowledge and critical reasoning).

Task Area 1 (TA1) – Identify Additional Evidence: Automatically find relevant supporting and contrary evidence in addition to the evidence used in a draft report.

Automatically extracting the argumentation from the analytic report

Draft analytic report

Corpus of source documents

Search for $H_1, H_{1a}, E_{1a}^*, H_{1b}, E_{1b}^*, \ldots$

Search for $H_3, E_{1a}^*, E_{2b}^*, E_{3a}^*, \ldots$

Hypothesis-driven discovery of evidence

What evidence would be observable if $H$ were true?
(look for necessary conditions for $H$ to be true or false).

What evidence would favor or disfavor $H$?
(look for sufficient conditions and indicators, for $H$ to be true or false).
Task Area 2 (TA2) – Identify Reasoning Strengths and Weaknesses: Automatically find strengths and weaknesses in the reasoning of a draft report.

Develop methods to automatically detecting and proposing mitigations for a wide variety of biases in an argumentation, such as:

- The **confirmation bias** (the tendency to seek only that information that is consistent with the preferred hypothesis), signaled when a hypothesis has only favoring arguments and evidence.

- The **satisficing bias** (choosing the first hypothesis that appears good enough rather than carefully identifying all possible hypotheses and determining which one is the most consistent with the evidence), signaled when the user has analyzed only one of the possible hypotheses, ignoring its alternatives. It is also signaled when several hypotheses are analyzed, but one of them has a significantly larger argumentation.

- The **absence of evidence bias** (failure to consider the degree of completeness of the available evidence), signaled when there are too many assumptions.

Task Area 3 (TA3) – Produce Recommendations to Increase Quality of Argumentation: Based in part on the output of TA1 and TA2, automatically produce comments that enable analysts to substantially improve the argumentation in their reports.
