thwink.org
All problems arise from their root causes.

March 22, 2019
Jack Harich
Montserrat Koloffon

Evaluation of Claim-Check System Components

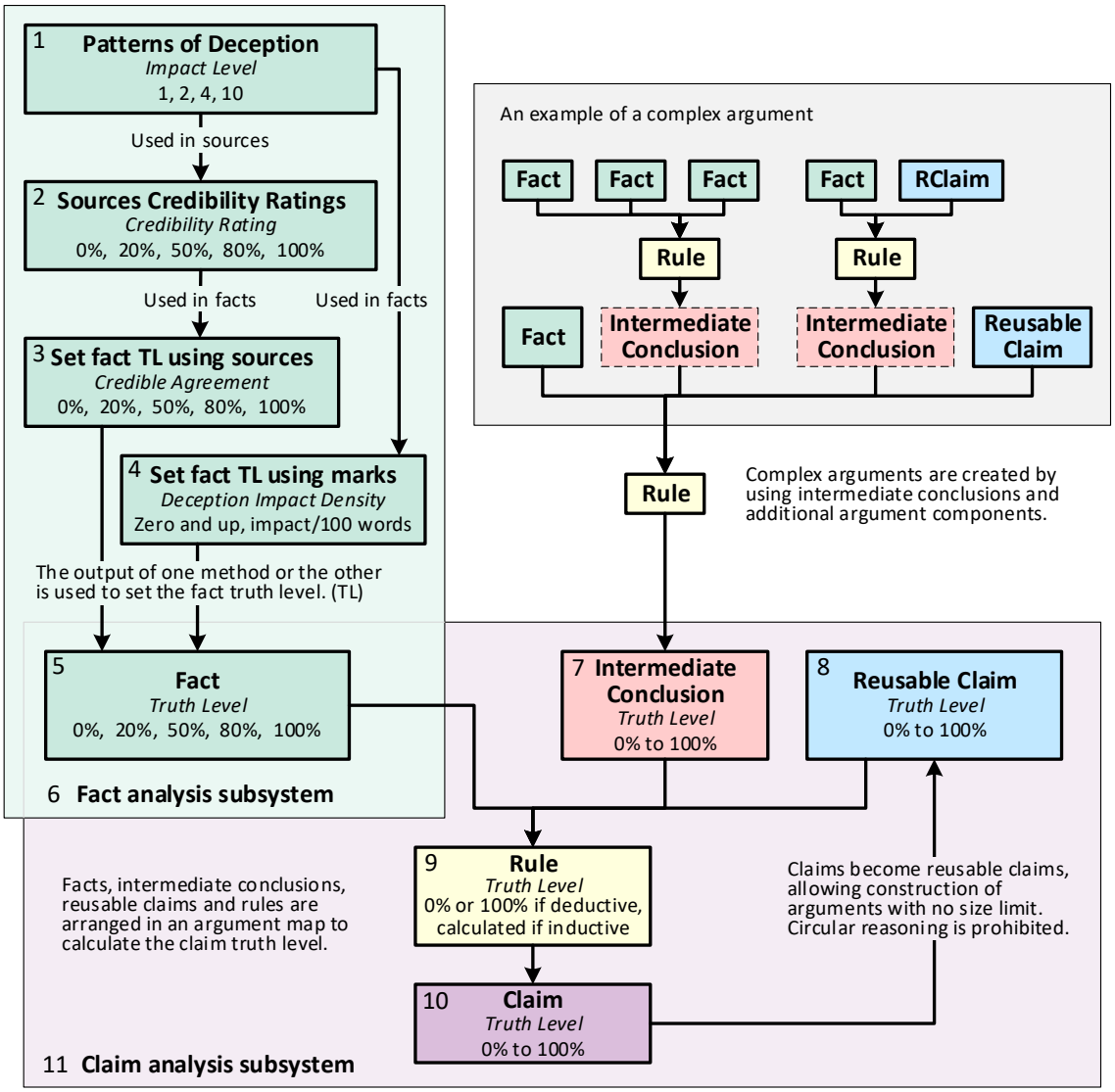
Goal

To evaluate the quality of the main components used in producing claim-checks, in terms of how well each component contributes in its role of helping to measure the truth.

How the main components work together as a system is shown below.

Components for Measuring the Truth of a Claim

Using Structured Argument Analysis



Component architecture

The diagram contains 11 components. The 5 green components form the fact subsystem. Components 5, 7, 8, 9, and 10 are used by the argument analysis subsystem. An example of a complex argument is shown to illustrate the flexibility of the system.

The quality of the total system depends on the quality of the component architecture plus the quality of the data in the database. The goal of the system is high-quality claim truth levels.

Component architecture is how the components work together (as shown on the diagram) to produce the desired quantity of each component and the emergent property of a high-quality system.

Each component has a **component quantity**, as indicated on the diagram, such as impact level and truth level. **Component quality** is defined as how well a component measures its component quantity.

The architecture attempts to capture the many heuristics people use when they reason correctly to determine the probable truth level of a claim. By doing this in a well-structured transparent manner using as much automation as possible and as much review as needed, the emergent result is the best possible approximation of the truth of a claim. We hope!

User input

User input occurs in every component except a fact, claim, and reusable claim. The output of components 3 and 4 becomes the truth level of component 5. Claims become reusable claims. System design makes it relatively easy for user input to lead to high quality component quantities, if the protocols for how to use the tool are followed. Part of the protocols is undergoing training.

All components use other component quantities as input to calculate their own component quantity *except* for patterns of deception and deductive rules. Users set pattern impact levels and deductive rule truth levels manually. Because of this, *patterns of deception and deductive rules serve as the foundation for the rest of the system and must be very high quality*.

Below is a summary of how user input works for the components.

6. Fact analysis subsystem

Fact truth levels are set using sources or marks. A decision tree determines which choice is best. The output of components 3 or 4 becomes the fact truth level.

✓ **1. Patterns of deception impact level** – A committee of users independently choses levels (high, medium, low, very low) for pattern characteristics, such as behavior impact, behavior change longevity, number of exposures required for infection, etc. The committee then meets, discusses impact level variance, and comes to a consensus on the proper characteristic levels using a formal procedure. The characteristic levels are then used to automatically calculate the pattern truth level. Much later pattern impact levels will be set by experimentation.

✓ **2. Source credibility ratings** – Two or more users independently perform content analysis on the same information source (usually a news organization) by copying and pasting approximately 5000 words of representative text. The text is then manually marked for patterns of deception, with comments for each mark. The patterns are selected from the patterns tree. The tool then calculates the credibility rating.

✓ **3. Set fact truth level using sources** – Here the user has decided to calculate the truth level of a fact by relying on information sources that have published the fact. One or more sources are selected. For each source selected, the truthfulness scale is set. If the scale allows choices, the truthfulness the source applied to the fact is selected. If at least one source has a credibility rating of 100%, the fact truth equals the truthfulness of the 100% CR source with the lowest truthfulness.

✓ **4. Set fact truth level using marks** – Here the user has decided to calculate the truth level of a fact them self by manually marking the fact text for each pattern of deception found in the text. This occurs in an identical manner to the way patterns are marked when setting source credibility ratings. The tool then calculates the fact truth level.

✓ **5. Fact** – When a fact is used in a claim, its weight or importance may be adjusted. However, its truth level remains fixed.

11. Claim analysis subsystem

This is the most advanced component in the system. The truth level of a claim is determined by using **Structured Argument Analysis**. This consists of writing a claim-check article, marking sections of the text as a claim, rule, fact, reusable claim, or intermediate conclusion, dragging and dropping the marks on an argument map, and arranging the map as desired.

All **valid arguments** contain one claim, at least one rule and at least one rule input. Rules inputs may be a fact, intermediate conclusion, or reusable claim. The weight or importance of rule inputs is adjusted to fine tune the argument. **Simple arguments** contain one rule. **Complex arguments** contain more than one rule, accomplished by adding intermediate conclusions.

✓ **7. Intermediate conclusion** – Complex arguments are created by adding an intermediate conclusion to an existing rule and then adding additional components to the intermediate conclusion.

✓ **8. Reusable claim** – After a claim is completed and published, it becomes a reusable claim. When a reusable claim is reused in a claim, its truth level remains fixed.

✓ **9. Rule** – When constructing an argument map, the user selects the appropriate rule from the rules tree and adds it to the argument map. That selection is a critical decision, since *rules are the backbone (the unifying logic) of an argument.*

✓ **10. Claim** – The truth level of the claim is automatically calculated as you work.

Current status of component quality

There's a lot of discovery and evolution still underway in this project, so this section is hard to keep up to date. The table below summarizes the current status of the quality of each component. This is, of course, our own best effort at an objective assessment. We welcome suggestions for improvement. The table adds an additional component that's not on the diagram.

Component	Quality	Status
1. Patterns of deception	Low	Currently under intense improvement. We are just getting started on a high-quality approach to setting pattern impact. The summary of how this works given above is our best guess at where this component is going.
2. Source credibility ratings	Low	Also currently under intense improvement. The same description above applies. In addition, this component can be used to set the credibility rating of individual articles.
3. Set fact TL using sources	High	Performing this task is supported by a decision tree, which educates and walks users through the best decisions on how to accomplish the task of setting a fact truth level. It's easy to choose sources and set their options. Given that data, the tool automatically calculate the fact truth level and displays all of the logic used to do that.
4. Set fact TL using marks	High	Same status as the above component, except this component sets a fact's truth level using patterns of deception marks.
5. Fact	Low	A fact truth level is set by component 3 or 4. All this occurs in an integrated, easy-to-perform manner. Thus, the tool aspect of this component has high quality. However, we have not yet entered a small starting collection of high-quality example facts. In addition, a chain only as strong as its weakest link, causing this component to be rated as low in quality.
6. Fact analysis subsystem	High	The quality of this component is high in comparison to present methods of fact-checking, which are intuitive and employ no comparable tool. All components in the subsystem use a reasonably accurate structured approach to setting their quantities.
7. Intermediate conclusion	High	This component exists only on an argument map. It works smoothly and is easy to learn and use in a flexible manner. It's so simple we can't think of any potential improvements, but we're sure there are some.
8. Reusable claim	High	The tool offers a robust method for claim reuse that is fully functioning and well-integrated with the rest of the system. Once a claim becomes a reusable claim, it's treated the same as a fact. This conceptually simplifies tool use and at the same time allows a very high level of work reuse.
9. Rule	Medium	The tool aspect of this component has reached high quality. Rules can be easily selected from the rules true. How each rule works is clearly described. Rules are used to calculate their conclusion's truth level. This is working very well for deductive and inductive rules. However, the collection of rules aspect of this component has only low quality so far. We are still in the process of assembling and documenting a solid collection of rules. But we do have a good starter set of rules, plenty good enough for preliminary work.
10. Claim	Low	Low because a chain is only as strong as its weakest link. The quality of this component equals the lowest quality of the above components.
11. Claim analysis subsystem	High	The quality of this component is high in comparison to present methods of claim-checking, which are intuitive and employ no comparable tool. Quality is also high in comparison to what's needed to create a formal argument to analytically determine the truth level of a claim. While there is tremendous room for improvement, this component is surprisingly mature, so much so that the limiting factor is the person, not the tool.
12. Online application	Medium	All of the above components are implemented using software and made available in a multi-user online application at TruthRatings.org. This is an open source project. High standards of usability and software best practices are being followed. While our own use of the website shows the tool works very well for our needs, we have not yet tested it on other users or many concurrent users. Small bugs continue to appear as we use it, mostly because software development is still ongoing and we have a non-professional programmer. We have also not yet engaged in heavy usability testing, which will no doubt reveal room for improvement. Nor has it received a third-party security testing and inspection. For these reasons, we feel this component is only medium quality.

To summarize, the first two components currently have low quality. Raising that is where our efforts are focused. Our short-term plan is to raise them to at least medium quality, which would automatically raise components 5 and 10 from low to medium quality. At that point we feel the system will be ready for external appraisal and discussion, because users will not be distracted by problems or apparent weakness. They will be able to fully see what the tool is capable of doing, how it does it, and what the long-term potential of tools for measuring the truth can be.