A Logic for Veracity

PIRO. (2016, September 30). Logic. Pixabay.

RESEARCH

‘A Logic for Veracity’.

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Background

When a piece of information is put out into the world it may be subjected to many attempts, both accidental and deliberate, to degrade it or tamper with it. When we are dealing with precious information, that is information which has value (cultural, monetary, scientific etc.), then having assurance that the information has stayed constant is vital. When that information is not kept hidden or otherwise protected then this becomes a problem. It may even be insoluble.

This work seeks to pin down a meaning for, and properties of, “veracity”.

A logic is a language and a set of rules which allow us to move, step-by-step: rule-by-rule, from some assumptions, expressed in the language, that we make about our problem to a conclusion, also in the language. Provided all the steps/rules are followed, it is guaranteed that the conclusion follows correctly from the assumptions. This is called a proof.

In this work we started from a logic that is “constructive” since it seems to be clearly what's needed—it does not lose information as we make reasoning steps, and it comes with a computability interpretation that is useful in our project setting.

We also worked on putting this logic into a software tool called Isabelle, which supports the use of the language and the rules in the sense that the software prevents us from using the rules incorrectly, and also provides some automatic in building proofs.

Main research findings

By starting from a simple basis and gradually building up the expressiveness of the language and rules, we were able to construct a language and rules which could express many use cases around the supply chains in the organic wine industry in Aotearoa New Zealand, and this gives us confidence that many similar areas can be formalised and then investigated in the same way.

Having expressed a supply chain, we can then ask whether some particular veracity claim (e.g. "this vineyard has organic certification") is supported by all the required evidence. If there is a problem with the claim, then the proof will not be possible, and the places where it fails are pointers to where in the certification process evidence is wrong or missing.

Relevance of findings to Aotearoa New Zealand

One main thing that we have tried to do is to make the logic neutral and simple with respect to prior ideas about truth, trust and authenticity, since these are very culturally-embedded notions. So, the work here can be used with far less cultural baggage than other treatments, which in an Aotearoa New Zealand setting is important, since different cultural norms can be expressed within this simple but flexible framework. There is no cultural “bedrock” that sits in the background dictating what the logic can be used for.

This means, we believe, that work elsewhere in our project around the recording and arguing about whakapapa, can be expressed in the logic too. We expect that work on developing software to support the gathering and legitimising of whakapapa will also feed into the logic work.