

Defining a Decidability Decider

By extending the notion of a Well Formed Formula to include syntactically formalized rules for rejecting semantically incorrect expressions we recognize and reject expressions that have the semantic error of Pathological self-reference(Olcott 2004). The foundation of this system requires the notion of a BaseFact that anchors the semantic notions of True and False. When-so-ever a formal proof from BaseFacts of language L to a closed WFF X or $\sim X$ of language L does not exist X is decided to be semantically incorrect.

A language L is a set of finite strings of characters from a defined alphabet specifying relations to other finite strings. These finite strings could be tokenized as single integer values.

A Relation is the same as a Predicate from Predicate Logic, essentially a Boolean valued function.

A BaseFact is an expression X of (formal or formalized natural) language L that has been assigned the semantic property of True by making it a member of the collection named: BaseFacts. (Similar to a math Axiom).

(1) BaseFacts that contradict other BaseFacts are prohibited.

(2) BaseFacts must specify Relations between Things.

Finite string Expression X expresses relation R of language L.

The above is the complete specification for a BaseFact.

To verify that an expression X of language L is True or False only requires a syntactic logical consequence inference chain (formal proof) from one or more BaseFacts to X or $\sim X$. (Backward chaining reverses this order).

$\text{True}(L, X) \leftrightarrow \exists \Gamma \subseteq \text{BaseFacts}(L) \text{ Provable}(\Gamma, X)$

$\text{False}(L, X) \leftrightarrow \exists \Gamma \subseteq \text{BaseFacts}(L) \text{ Provable}(\Gamma, \sim X)$

Sentence (mathematical logic)

In mathematical logic, a sentence of a predicate logic is a boolean-valued well-formed formula with no free variables. A sentence can be viewed as expressing a proposition, something that must be true or false. The restriction of having no free variables is needed to make sure that sentences can have concrete, fixed truth values: As the free variables of a (general) formula can range over several values, the truth value of such a formula may vary.

Defining a Generic Decidability Decider:

$\forall L \in \text{Formal_Systems}$

$\forall X \in \text{Closed-WFF}(L)$

$\sim \text{True}(L, X) \wedge \sim \text{False}(L, X) \rightarrow \text{Incorrect}(L, X)$

Copyright 2018 (and many other years since 1997) Pete Olcott