

Truth and Justification in Knowledge Representation

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The Concept of Knowledge in Philosophy and in CS

Neglect of epistemic considerations in logic

Justification Logic and Justification in KR

Conclusion

Knowledge according to the Philosophical Epistemology: JTB

Knowledge as Justified True Belief:

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1. p is true
2. S believes that p

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Knowledge as Justified True Belief:

Subject S knows that p (where p is a proposition) just in case the following three conditions are satisfied:

1. p is true
2. S believes that p
3. S is justified in believing that p .

Gettier 1963

$$\frac{16}{64} = \frac{1\cancel{\phi}}{\cancel{\phi}4} = \frac{1}{4}$$

$$\frac{26}{65} = \frac{2\cancel{\phi}}{\cancel{\phi}5} = \frac{2}{5}$$

Knowledge in CS/IT

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No mention of justification in the studied CS literature!

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Puzzle: Why KR makes use of (formal) ontology but not of (formal) epistemology?

Justification as a practical issue

A regular user of KR system has no means to verify/justify an information obtained via the system provided by this very system. The existing verification technologies are not designed to be available to regular users. Hence the *Post-Truth* and related social/political issues.

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- ▶ Support justification/verification in form, which is specific w.r.t. obtained information: specific evidences rather than general assurances.

Historical and Conceptual Reason Why Justification is not Supported:

Standard logical tools and gadgets such as Classical first-order logic with the Tarskian formal semantics realise a philosophical conception of logic that doesn't prioritise justification and doesn't support a satisfactory formal treatment of justification (Gettier).

This conception of logic had a strong impact on AI/KR in its early days.

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- ▶ Truth-preserving derivations are conventionally called “proofs”

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- ▶ Truth of axioms needs to be *evident*; the truth-preserving property of formal derivation needs to be *manifest*. Formal derivations, generally, do not qualify as proofs in an epistemic sense, i.e. as evidences (Prawitz) .

Truth and Knowledge of Truth

- ▶ Truth of axioms needs to be *evident*; the truth-preserving property of formal derivation needs to be *manifest*. Formal derivations, generally, do not qualify as proofs in an epistemic sense, i.e. as evidences (Prawitz) .
- ▶ the neglect of epistemic considerations in (20th century) logic (Sundholm)

Manifesto of Justification Logic (Artemov et al.)

Justification Logic is a logic of the 21st century. We cannot simply accept a claim that a given proposition is true. It is also not appropriate to accept a proposition just on the basis of another's claim of knowing it.

Manifesto of Justification Logic (contd)

With an overabundance of easily accessible and yet unreliable information, we need checkable evidence that a given proposition is true. Justification Logic provides a well-principled logical framework for the corresponding reasoning.

Manifesto of Justification Logic (contd)

Justification Logic introduces to the logical language a long-anticipated general notion of justification.

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- ▶ ...

Ultimately the theoretical inquiry into Justification Logic and the practical solutions should converge.

СПАСИБО!