

Truth and Justification in Knowledge Representation

While the traditional philosophical epistemology stresses the importance of distinguishing knowledge from true beliefs, the formalisation of this distinction with standard logical means turns out to be problematic. In Knowledge Representation (KR) as a Computer Science discipline this crucial distinction is largely neglected. A practical consequence of this neglect is that the existing KR systems store and communicate knowledge that cannot be verified and justified by users of these systems without external means. Information obtained from such systems does not qualify as knowledge in the sense of philosophical epistemology.

Recent advances in the research area at the crossroad of the computational mathematical logic, formal epistemology and computer science open new perspectives for an effective computational realisation of justificatory procedures in KR. After exposing the problem of justification in logic, epistemology and KR, we sketch a novel framework for representing knowledge along with relevant justificatory procedures, which is based on the Homotopy Type theory (HoTT). This formal framework supports representation of both propositional knowledge, aka knowledge-that, and non-propositional knowledge, aka knowledge-how or procedural knowledge. The default proof-theoretic semantics of HoTT allows for combining the two sorts of represented knowledge at the formal level by interpreting all permissible constructions as justification terms (witnesses) of associated propositions.