

An Exploration of Superexpertise

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Abstract

This thesis considers the nature of expertise, focusing on expertise beyond normal human capabilities; such expertise is called, by the author, *superexpertise*. The question asked in this thesis is: how can people manage problems that require superexpertise? A model of superexpertise is constructed through an exploration of aspects of this concept set out in seven published papers on the subject. In the first paper, published in 2007, the concept of superexpertise was identified with the characteristic of automation of large scale combinatorics by a legal expert system shell, eGanges. Further contributions to the model are added in the remaining six papers so that conclusions can be drawn as to the nature of superexpertise. The notion of superexpertise has evolved from the work of expert systems, knowledge based systems, knowledge representations and problem solving methods. It is particularly useful for problems involving large-scale combinatorics and sorting according to a prescribed multi-valued logic.

To manage superexpertise, it must be elicited from expert epistemology. An expert epistemology is a theory about the knowledge bound up, encompassed and contained in the expertise and includes knowledge representation, semantics, specifications, heuristics, reasoning, etc; it is concerned with 'How we know what we know', and deals with the means of producing knowledge, including how knowledge is acquired. Specifically, the aim of this thesis was to show the applicability of two epistemologies, called eGanges and NeGame (a complement to eGanges), for three particular types of problems, namely, Quality Control problems, Adversarial problems and Negotiation problems. Initially a qualitative methodology of case studies of superexpertise is relied on, but quantitative methodologies are also used as mathematical characteristics of superexpertise are revealed and developed. An introductory definition of superexpertise is expanded into a model with two major features: (1) large scale combinatorics that require (2) multi-value logic processing. The NeGame epistemology was introduced in this thesis, but requires further work and refinement, along with a logical verification more detailed than can be provided by these limited case studies.

Statement of Authenticity

Except where otherwise indicated, this thesis is my own original work, and has not been submitted for a higher degree to any other university or institution.

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