

Abstract

Although Sugeno defuzzification method is considered as the most computationally effective one, there is uncertainty about defuzzified output, because it generates singleton fuzzy values objectively and is not well evaluated. Understanding commonsense capability is an active area of research in artificial intelligence. Developing a commonsense modelling system is making this knowledge explicit. In this context, research into incorporation of commonsense knowledge within statistical inference systems is of great importance.

This thesis is to discover a defuzzification method which makes the estimation of a singleton fuzzy value in a subjective way for knowledge-based systems. An approach for bringing commonsense knowledge into statistical fuzzy inference systems, a procedure of modelling commonsense knowledge is proposed. A methodology was used directly integrated with the principal component analyzer, fuzzy inference engine, knowledge base and user interface. The principal component analyzer was used for reducing dependencies directly integrated with the user interface, whereas the fuzzy inference engine has been used for fuzzification and defuzzification directly integrated with the fuzzy inference system. The defuzzification process was based on extended Sugeno defuzzification model integrated with extracted principal components. The knowledge base was used to represent domain knowledge in terms of fuzzy rules. Fuzzy operators and membership functions. The postulated system for

commonsense knowledge was used to emulate the inference systems domain considering domains with explicit and implicit knowledge. In doing so, three objectives were formulated. Firstly, determining singleton fuzzy values in Sugeno System for effective defuzzified output of knowledge based systems, secondly, use of fuzzy logic with PCA as the input to be used for developing a statistical fuzzy inference system for modelling commonsense knowledge and thirdly, enabling knowledge-modelling approach for modelling commonsense knowledge in, psychological assessment, which enables holistic approach for clinical psychology. A system, facilitating the commonsense knowledge modelling in statistical fuzzy inference systems was designed to test objectives.

According to Ayurveda medicine, recognition of mental constitution type is an important component in medicine for clinical psychology. As an application of modelling commonsense knowledge for statistical fuzzy inference systems, the classification of mental constitution in Ayurveda medicine was used. The evaluation of the statistical fuzzy inference system for domains with commonsense knowledge was done by testing of the system with data sets such as payment card, non-communicable diseases and communicable diseases. It has been examined if the system was capable of exploring the effects of commonsense knowledge modelling, with the conclusion that it minimized the error at the context of defuzzification by Principal Component Analysis. This is a novel approach for defuzzification by principal component analysis. The defuzzification process is used to enable one to enhance the modelling of commonsense knowledge.

It concluded that a minimized the error is a success. This is the achievement through defuzzification by principal component analysis. Evaluation of the system shows a percentage of 92 accuracy.