Towards a Methodology for Incorporating Human-Computer Interaction Protocols in Knowledge-Based Systems

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Abstract

The research presented in this thesis describes the development of the FOCUS framework for use during the analysis stage of the knowledge-based system life cycle. The application of FOCUS (FunctiOns and Communication facilities for USers) helps the knowledge engineer to tackle the important human-computer interaction issues that arise when building knowledge-based systems.

The motivation for this research arises from the complexity of the interaction process. Firstly, the functions that users require to help them to achieve their goals have to be identified. Secondly, adequate communication facilities must be provided so that users can run the knowledge-based system, understand its problem solving capabilities and ask questions about the underlying domain. The situation is further complicated if users have little in common; their domain and/or computing backgrounds might be quite different. Analysis of the literature indicates that human-computer interaction is an issue of some importance but that detailed guidelines are often lacking.

FOCUS has been developed to assist the knowledge engineer during the analysis phase of the knowledge-based system life cycle. FOCUS has five stages: problem specification, preliminary analysis, user analysis, functional specification and detailed analysis. It recognises that the intended users of an expert system in an organisation may not all want the same problem-solving capabilities; the major user groups are identified and the functional requirements of each group specified. Communication issues can then be considered for each group. At the same time the analysis of the organisation's needs and elicitation of knowledge are not neglected.

By the end of the analysis stage, the knowledge engineer has completed the conceptual model with its three components: the model of expertise, model(s) of communication and user requirements. A comprehensive picture can be built up of the users' application, explanation and interface needs. The resulting user models together with the model of communication are the basis at the design stage for developing an interface to provide users with the desired functionality.

The FOCUS process has been evaluated using student enrolment at Massey University as the domain. The purpose of the case study is not to build a knowledge-based system but to assess the value of FOCUS It is suggested that a framework of this kind, for the analysis phase, should be structured, focused, open and practicable. Experience with FOCUS indicated that these criteria could all be met.

In summary, FOCUS integrates principles from the area of human computer interaction with a user-centred approach to knowledge-based systems development.

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Publications

The following publications all relate to the research carried out for this thesis:

Kemp, E. A. and Kemp, R. H. (1990). Integrating Expert Systems into an Information Systems Strategy. C. Yau (Ed.), *Proceedings of International Conference on Systems Management* (pp. 109-115), Hong Kong.

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Kemp, E. A. and Kemp, R. H. (1991). Explanation in knowledge-based systems: a user perspective. *Proceedings of IJCAI Workshop on explanation generation for knowledge-based systems* (pp. 57-80), The Netherlands: University of Twente.

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