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OOExpert: Distributed Expert System for Automatic Object-Oriented Software Design

OOExpert：オブジェクト指向ソフトウエア自動設計用分散型エキスパートシステム

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Abstract: Researchers and software designers come to a conclusion that identifying objects including associations, attributes is an ill-defined task and there is no unified methodology for object-oriented software design. In this research, we suggest an approach to solve the difficulties of object-oriented design by developing a distributed expert system that contains formulated design patterns and rules that aims at automating object-oriented design process in an interactive way. A novel point is using an interactive user interface to enable software designer and the system communicate with each other in order to determine the best design, without disturbing the creativity of the designer. Thus, making it possible for distributed expert system, to overcome the data sharing and the interoperability problems in a groupware. In this paper we present the system architecture and the research outlines.

1 Introduction

The four challenges of object-oriented design are to identify the objects and classes needed to implement the software, describe the relationships between the identified objects and classes, define the behavior of the objects by describing the function implementations of each class, and refine and organize classes by using inheritance to share common structure [Rumbaugh et al., 1991] [Holland et al., 1996]. These are very complicated challenges because of there dependence on heuristic [Kato, 1998].

On the other hand, changes of social and technology’s field result in the change of software development framework, from command system into cooperation system in groupware using network technology as media [Drucker, 1988]. This brings an urgent need of a new Computer Aided Software Engineering (CASE) tool, which can handle data sharing, interoperability, compatibility and portability problems.

Researchers and software designers come to a conclusion that identifying objects including associations, attributes is an ill-defined task, regarding of the difficulties of heuristic [Kato, 1998] [Holland et al., 1996] and there is no unified methodology for object-oriented software design. This is mainly due to lack of formalism for object-oriented software design.

In this research, we formulate design patterns and rules, and store them in the distributed knowledge bases of the OOE xpert system. The system can overcome certain difficulties in the object-oriented design, difficulties in the very large knowledge base system, and it can fulfill the need of a new CASE tool for groupware.

2 System Architecture

Figure 1 shows an overview of the OOE xpert’s architecture. This system is composed of User Interface, Communication Engine, Reasoning Engine, Distributed Knowledge Base, and Documentation Engine. Each engine with a running autonomous task is called an expert unit.

2.1 User Interface

There are four functions that are managed by the user interface unit, they are object-oriented design editor, reasoning engine process (result) viewer, Java source code viewer and documentation function. Using this user interface unit, software designer and expert system can communicate with each other in order to determine the best design.

2.2 Communication Engine

The communication engine is mainly responsible for maintaining connection between user interface unit and another expert units besides of message management. We are implementing the communication engine by using CORBA (Common Object Request Broker
2.5 Documentation Engine

Documentation engine plays the role of reasoning engine’s assistant. The documentation engine performs three main tasks: documenting all tasks that are produced by reasoning engine, preparing and reformating the above mentioned data for to be transferred to the user interface units, and assisting user or software designer to create good software documents.

3 Conclusion

In this paper, we presented the outlines of an ongoing research project to build a distributed expert system for supporting object-oriented software design (OOExpert). The interactive user interface, reasoning engine, documentation and communication engines are already developed. The knowledge base which contains rules for automating design process is under development.

Using this system, software designers and expert system can communicate with each other in order to determine the best design, without disturbing the creativity of the designer.

References


