Chapter 9

An Intelligent Computational Argumentation System for Supporting Collaborative Software Development Decision Making

Xiaoqing (Frank) Liu
Missouri University of Science and Technology, USA

Ekta Khudkhudia
Missouri University of Science and Technology, USA

Lei Wen
Missouri University of Science and Technology, USA

Vamshi Sajja
Missouri University of Science and Technology, USA

Ming C. Leu
Missouri University of Science and Technology, USA

ABSTRACT

Many design decisions need to be made in a software development process. The development process usually involves many participants from multiple perspectives, who may be in geographically dispersed locations. Existing argumentation based software design rationale capturing methods and systems can support software development decision making by documenting design rationale for critical decisions. However, their applications are very limited since their argumentation networks are usually very large and they are hard to comprehend and use for effective decision making. In this chapter, we present a web-based intelligent computational argumentation method for supporting collaborative software development decision making. It provides tools for argumentation reduction, assessment of impact of...
INTRODUCTION

Development of software is an evolutionary process which requires intelligent decision making for selecting the best software design or other alternative at every phase of the software development lifecycle. The software development decision making becomes difficult when it involves many stakeholders with conflicting objectives and requirements from multiple perspectives. These stakeholders may be in geographically dispersed locations, which make software development decision making more challenging. In addition, many of the design objectives and requirements are vague and imprecise. In order to resolve conflicts, the participants usually put forward their arguments to justify their respective points of view. Since there are many people involved in the decision making, the number of arguments grows very fast and it becomes very hard to keep track of them. In order to be able to make an efficient and reasonable decision, an effective argumentation based conflict resolution method is needed.

To address the above problems we have developed a web-based system using an intelligent computational argumentation model for collaborative decision making in software development and selection of the most favored development alternative. It provides users with a solid decision making support in software development by allowing stakeholders to capture their development rationale from multiple perspectives and identifying their most favored alternative based on intelligent evaluation of alternatives and assessment of arguments in an argumentation network using fuzzy logic based argumentation inference mechanisms.

The objective of this chapter is to present a fuzzy logic based intelligent computational argumentation method and the development of a web-based system using this method for supporting collaborative decision making in software development. The chapter is organized as follows. The background section reviews related research work. Next the main section discusses the intelligent computational argumentation for collaborative decision making in software development using fuzzy logic, including the framework, intelligent argumentation network, intelligent argumentation reduction, intelligent priority assessment, and detection of self-conflicting arguments. An application case study is then used to illustrate how the proposed method and system are applied. Future research directions are next discussed. A conclusion is provided in the end.

BACKGROUND

Argumentation based design rationale capture methods and tools have been developed to capture software development rationale for supporting collaborative development decision making. They are built based primarily on a classical model of argumentation developed by philosopher Toulmin (1958). An earlier method gIBIS (graphical IBIS) represents design dialogs as a graph (Conklin & Begeman, 1988). While representing issues, positions, and arguments, gIBIS failed to support representation of goals (requirements) and outcomes. REMAP (REpresentation and MAintenance of Process knowledge) extended gIBIS by providing the representation of goals, decisions, and design artifacts (Ramesh & Dhar, 1992). The REMAP work focused on capturing the process knowledge, i.e., the history about the design decisions in the
This title is available in InfoSci-Books, Business-Technology-Solution, InfoSci-Intelligent Technologies, Science, Engineering, and Information Technology, InfoSci-Computer Science and Information Technology, Advances in Computational Intelligence and Robotics. Recommend this product to your librarian:

www.igi-global.com/e-resources/library-recommendation/?id=1

Related Content

From Planning Tools to Intelligent Assistants: Meme Media and Logic Programming Technologies

www.igi-global.com/chapter/planning-tools-intelligent-assistants/24400?camid=4v1a

Supporting Text Retrieval by Typographical Term Weighting

www.igi-global.com/article/supporting-text-retrieval-typographical-term/2415?camid=4v1a

Smart Content Selection for Public Displays in Ambient Intelligence Environments

www.igi-global.com/article/smart-content-selection-public-displays/77832?camid=4v1a

Optimum Allocation of Transmission Technologies for Solving the BTS Interconnection Problem in Cellular Systems

www.igi-global.com/chapter/optimum-allocation-of-transmission-technologies-for-solving-the-bts-interconnection-problem-in-cellular-systems/123079?camid=4v1a