VirginiaTech
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Computer Science Seminar Series, 2009

National Capital Region

Extractive Product Line Requirements Engineering

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Friday, October 30, 2009
1:00PM- 2:00PM, NVC 325

Abstract

Proactive approaches to software product line engineering slow its adoption by requiring substantial up-front effort and abrupt transition from an organization's existing practices. To lower the adoption barrier, we contribute a lightweight framework for extracting, modeling, and analyzing a software product line's requirements assets. We introduce the notion of *functional requirements profiles* (FRPs) according to the linguistic characterization of a domain's action-oriented concerns, and show that FRPs can be extracted from a natural language document based on domain-aware lexical affinities that bear a verb-DO (direct object) relation. We then use Fillmore's case theory to analyze each FRP's semantics so as to model the product line's variability and constraints. We also leverage formal concept analysis to study the modularity and interactions between functional and quality requirements. Several empirical studies are described to show that our framework complements contemporary methods by enabling engineers to develop domain models more easily.

Biography

Nan Niu is an Assistant Professor in the Department of Computer Science and Engineering at Mississippi State University. His main research interests are in the area of Software Engineering. His current focus is requirements engineering, concern manipulation, and software reuse. He won the best paper award at the IEEE International Symposium on Web Systems Evolution, was the program co-chair of the Early Aspects Workshop dealing with modularity in requirements engineering architectural design, and is currently the posters and demos co-chair for the 18th IEEE International Requirements Engineering Conference (RE'10). Nan received his Ph.D. from the University of Toronto in 2009, his M.Sc. degree from the University of Alberta in 2004, and his B.Eng. degree from Beijing Institute of Technology in 1999, all in Computer Science. He worked as a software engineer at Lenovo from 1999 to 2001 in Beijing, China.