

Extractive Product Line Requirements Engineering

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Abstract

Proactive approaches to 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 define 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 - direct object' relation. We then use Fillmore's case theory to characterize each FRP's semantics so as to model the domain's commonalities and variability's. We discuss an application of FRPs to match stakeholder terminology using ideas from psychology. Several empirical studies are described to show that our framework complements contemporary methods by enabling engineers to develop domain models more easily. Overall, our work shows that, in extractive product line requirements engineering, 'scenarios define problem, primitives determine context, and form follows function.'

BIO

Nan Niu is a Ph.D. candidate in the Department of Computer Science at the University of Toronto. His main research interests are in the area of Software Engineering. His current focus is on extracting, modeling, and analyzing a software product line's requirements assets. He won the best paper award at the IEEE International Symposium on Web Systems Evolution, has taught Web programming courses at the University of Toronto, and is the program co-chair of the upcoming Early Aspects Workshop that deals with modularity in requirements engineering and architectural design. Nan received his M.Sc. degree from the University of Alberta in 2004 and his B.Eng. degree from Beijing Institute of Technology in 1999. He worked as a software engineer at Lenovo from 1999 to 2001 in Beijing, China.