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Ph.D. Topic:	An Investigation into Fuzzy Logic Driven Software Security Requirements Elicitation Techniques

Ph.D. Research Findings

This thesis investigates the various software security requirements (SecRs) elicitation techniques under fuzzy environment. In this thesis, two methodologies have been developed to elicit the security requirements and its analysis using fuzzy logic. In our work, a method has been developed using fuzzy logic for the identification of those requirements in which more security is required during the development process. To deal with the uncertainty which is due to vagueness during the computational process, the canonical representation of multiplication operation associated with $L^{-1}R^{-1}$ inverse arithmetic principle is used so that the ranking order of the requirements which needs more security can be identified. A SecRs diagram has also been introduced to model the SecRs. In addition to this, we have extended the security quality requirements engineering (SQUARE) method to identify and analyse the SecRs by applying the fuzzy logic and goal-oriented approach. In the extended SQUARE methodology, the fuzzy technique for order of preference by similarity to ideal solutions is employed to elicit the ranking value of those requirements which are more important according to the security point of view. The application of both the methodologies is explained with the help of the requirements of an institute examination system. An algorithm has also been developed to generate the one time password for the requirements from "hash-based message authentication code" based on alphanumeric values. The N-gram test was used to show the randomness in the generated passwords. The aim of this algorithm was to strengthen the proposed fuzzy logic driven security requirements engineering methods for providing the authentication in software requirements so that only authenticate users can access the system.