ABSTRACT

In this thesis, an intelligent framework for effective access control and Intrusion Detection has been proposed and implemented in order to provide effective Security for web databases. The architecture of this system consists of two major subsystems namely, Access Control Subsystem and Intrusion Detection Subsystem. The access control subsystem provides effective security through new Spatio-Temporal Role Based Access Control Techniques. In addition it provides an additional access control feature based on action status model. The Intrusion Detection Subsystem provides techniques for effective classification of data. This subsystem has four major modules namely the preprocessing module, outlier detection module, classification module and decision making module.

The preprocessing module that consists of two different agents namely feature selection agent and feature validation cum ranking agent. The main function of the feature selection agent is to determine a minimal feature subset by eliminating redundant and useless features from the dataset using a Fuzzy Rough Set Approach. The feature validation and ranking agent collects all the features selected by feature selection agent and checks whether they are valid or not and ranks all the valid features using a Ranking Algorithm. The Outlier Detection module collects the data from preprocessing module and detects the outlier using the proposed Fuzzy rough set based classification algorithm. The classification module is used to classify the web log data using
the proposed Fuzzy rough set based Decision Tree (DT) Algorithm, SVM and hybrid of these two classifiers. The Decision making module utilizes decision making and action agent to monitor the incoming traffic pattern and to classify them as normal or intruder and then to take action accordingly.

The Access Control subsystem utilizes intelligent agents for processing requests. Among the various agents used in this subsystem, role management agent receives the requests and validate them. The requests are then forwarded to the Role Based Access Control (RBAC) to the manager. Moreover, this agent assigns the privileges users based on spatio –temporal constraints and also to assigns role to users. The rule management agent present in this subsystem provides rule matching and rule firing techniques, in order to increase the accuracy level. All these subsystems are supported by the web server, security manager, web database manager and web data bases.

The major contributions of this thesis are the proposal of a new architectural framework, new agent based intelligent techniques for implementing effective access control and the proposal of new classification algorithms using Fuzzy Logic, Rough Sets, Decision Trees and Support Vector Machines for effective classification of outliers and intrusions.