CHAPTER 6

CONCLUSIONS AND FUTURE ENGANCEMENTS

In this thesis, a new framework that consists of an Intelligent Agent Based Access Control subsystem and Intrusion Detection subsystem for securing the Web Database has been proposed and implemented. In order to provide an effective access control system, new access control algebra and new policies using rules have been proposed and implemented. In order to perform intrusion detection effectively, a hybrid Intelligent Agent based Intrusion Detection system has been proposed in this work. This IDS has been developed by proposing a new Fuzzy Rough Set Based Decision Tree Algorithm and a Fuzzy Rough Set Based outlier Detection Algorithm for identifying Intrusions effectively and to reduce the false alarm rate considerably. The major contributions of this research work are the proposal of the new architecture, Spatio-Temporal Role Based Access Control (STRBAC) and Spatio-Temporal Action Status Access Control (STASAC) models using Intelligent Agents, privacy maintenance using modified conflict detection algorithm and an efficient intrusion detection system. The Experimental results obtained from this work have been considered with the state of the art methods for each contribution. In access control, the comparison is made between RBAC and the proposed ISTRBAC. Similarly, in intrusion detection, the proposed fuzzy rough set based classification method has been compared with both SVM and the proposed Hybrid classification method.
6.1 ACCESS CONTROL SUBSYSTEM

In the Access control Subsystem of the proposed model, separate agents for managing the overall access control process have been proposed. In addition production rules, spatio-temporal constraints, user-role assignment policies and privacy issue management features through permission assignment have been proposed and implemented. The access control subsystem uses a collection of active rules and events to check various constraints and to resolve conflicts in user-role assignment. It also takes care of role permission assignments and operations.

The access control policies are implemented using spatio-temporal constraints and rules on roles. From the experiments conducted in this work, it has been observed that STRBAC with intelligent agents performs better by 5% since it has filtered more number of users than the existing models namely RBAC and TRBAC. With the other in this work, it has been observed that the proposed STASAC model performs better by 7% when it is compared with the existing ASAC model. Moreover, to overcome the privacy issues, a modified conflict detection algorithm has been implemented for in number of permission assignments.

6.2 INTRUSION DETECTION SUBSYSTEM

In the Intrusion Detection Subsystem, a Fuzzy Rough Set based feature selection algorithm has been used. In addition, two new classification algorithms namely a fuzzy rough set based decision tree algorithm and a fuzzy rough set based outlier detection algorithm have been proposed for performing effective classification. The result obtained from the fuzzy rough set based decision tree algorithm has been compared with SVM. From this comparison, it has been observed that the proposed fuzzy rough set based decision tree algorithm provides better classification accuracy than SVM.
When outlier detection is performed before classification, the classification results are improved further by 3% when it is classified without performing outlier detection. Experiments have been conducted by using a hybrid classification algorithm which combines the rough set based decision tree algorithm and SVM. From these experiments, it has been observed that the detection accuracy is improved further by 2.5%. The main advantage of this proposed system is that the outlier detection process reduces the false alarm rate considerably.

6.3 FUTURE ENHANCEMENTS

This work can be extended in a number of ways to improve the security. First, a Fuzzy Rough Set Based Role Based Access Control (FR_RBAC) model can be developed. Second, a Rough set based Action Status Access control model can be developed and a suitable algebra can be developed for these models. Third, Team Automata based model can be designed to ensure the coordination and cooperation among various components involved in the system.