CHAPTER 6

CONCLUSIONS AND FUTURE WORKS

6.1 CONCLUSIONS

In this thesis, a new framework for improving the task of temporal mining for providing effective security in temporal databases has been proposed and implemented. For this purpose, a new temporal query language called ETMSQL has been designed and implemented which can store and retrieve the temporal data effectively. Moreover, this system can perform reasoning on the past, present and future data and can mine the data for providing effective security. The major contributions of this work are the proposal of a new architecture, a special query language called ETMSQL, a new rule system, temporal role based access control methods using intelligent agents and intrusion detection methods for identifying the intrusions effectively.

6.1.1 Temporal Reasoning Subsystem

The temporal database system proposed in this work, provides a temporal reasoning subsystem which has been developed to work with the query language ETMSQL. The various contributions of this subsystem include the following features:

- Prediction from incomplete temporal information.
- Explanation based reasoning
• Capturing temporal dependencies among intervals for reasoning by temporal constraint satisfaction.
• Planning through rule based methods.
• Learning rules from prediction, explanation and planning.
• MINE options for security in which security is provided with both temporal role based access control and intrusion detection.
• Special constructs for rules, that helps to generate and store rules which can be fired using forward chaining and backward chaining control flows.

6.1.2 Access Control Module

In Temporal Role Based Access Control (TRBAC) Module with intelligent agents, the system considers two kinds of time in temporal information namely instant time and interval time. Various temporal role based intelligent agents have been used to validate the privileges, which are called by the security decision manager which makes decision with the coordination of rule system. Based on implementation of the algorithm for Temporal Role Based Access Control with intelligent agents, this system has been tested with various data sets based on interval and instant time parameters. From the experiments conducted with TRBAC and TRBAC with Intelligent Agents, it is observed that TRBAC with Intelligent Agents performs better by 7% since it has filtered more number of users than TRBAC.
6.1.3 Intrusion Detection Module

The main advantage of this proposed module is that access privileges are time stamped and hence have start date and end date. Any user who tries to use the previous role after expiry of time are prevented by this system. Moreover, a Modified Bayesian Classification Algorithm has been proposed in this work for effectively identifying the intruders and to take necessary actions with the help of Action Agent. From the experiments carried out in this work, the intrusion detection rate has been improved by 11% in comparison with the existing MAIDS because the use of temporal mining techniques. Moreover, the false positive rate, Denial of Service (DoS) attack, Probing attack, Remote-to-Local (R2L) and User-to-Root attacks have been compared between Modified Bayesian Classification Algorithm and Naïve Bayesian Classification Algorithm. From the comparisons, we observed that the detection rate is 5% higher in the proposed Modified Bayesian Classification Algorithm.

6.2 FUTURE WORKS

Further works in this direction could be the provision of techniques to analyze user patterns, classification and clustering in order to improve the temporal mining algorithms for all the components with respect to temporal constructs. Moreover, the security mechanisms considered in this work focused only on a very few attack types. This can be enhanced to detect all types of attacks by creating and analyzing temporal constraint networks.