

ADVANCES IN *SOFT COMPUTING* 50

Juan M. Corchado
Sara Rodríguez
James Llinas
José M. Molina (Eds.)

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Preface

The International Symposium on Distributed Computing and Artificial Intelligence is an annual forum that brings together ideas, projects, lessons, etc. associated with distributed computing, artificial intelligence and its applications in different themes. This meeting has been held at the University of Salamanca from the 22th to the 24th of October 2008. This symposium has been organized by the Biomedicine, Intelligent System and Educational Technology Research Group (<http://bisite.usal.es/>) of the University of Salamanca. The technology transfer in this field is still a challenge and for that reason this type of contributions has been specially considered in this edition. This conference is the forum in which to present application of innovative techniques to complex problems. The artificial intelligence is changing our society. Its application in distributed environments, such as the Internet, electronic commerce, mobile communications, wireless devices, distributed computing, and so on is increasing and is becoming an element of high added value and economic potential, both industrial and research. These technologies are changing constantly as a result of the large research and technical effort being undertaken in both universities and businesses. The exchange of ideas between scientists and technicians from both academic and business areas is essential to facilitate the development of systems that meet the demands of today's society.

This symposium has evolved from the Iberoamerican Symposium on Distributed Computing and continues to grow and prosper in its role as one of the premier conferences devoted to the quickly changing landscape of distributed computing, artificial intelligence and the application of AI to distributed systems. This year's technical program is extremely strong and diverse, with contributions in both established and evolving areas of research. Submitted papers came from over 16 different countries, representing a truly "wide area network" of research activity. The DCAI technical program includes 88 papers (74 long papers, 12 short papers and 2 doctoral consortium) selected from a submission pool of 142 papers, from 16 different countries. In addition to the main DCAI program, DCAI'08 is host to several other events: Third Symposium of Ubiquitous Computing and Ambient Intelligence 2008, Second International Workshop on Practical Applications of Computational Biology & Bioinformatics, and Second International Workshop on User-Centric Technologies and applications.

We thank the excellent work of the local organization members and also from the members of the Program Committee for their excellent reviewing work.

October 2008

Juan M. Corchado
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A Multiagent Based Strategy for Detecting Attacks in Databases in a Distributed Mode

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Abstract. This paper presents a distributed hierarchical multiagent architecture for detecting SQL injection attacks against databases. It uses a novel strategy, which is supported by a Case-Based Reasoning mechanism, which provides to the classifier agents with a great capacity of learning and adaptation to face this type of attack. The architecture combines strategies of intrusion detection systems such as misuse detection and anomaly detection. It has been tested and the results are presented in this paper.

Keywords: Multi-agent, SQL injection, Security database, case-based reasoning, IDS.

1 Introduction

The exponential growth of the computer network and the increase in the interconnection between networks has extended the offer of new services within the cyberspace [1]. The information volume with a sensitive value for the organizations is stored on information structures denominated databases and this information generally is transmitted across computer network. Databases are the core of many information systems, reason for which databases are increasingly coming under large number of attacks. Every day are founded new vulnerabilities in security systems intended to protect databases. These vulnerabilities are used by hackers in order to carry out attacks on the stored data. A special intrusion type within of databases is the SQL injection attack, which occurs when the intended effect of a SQL sentence is changed by inserting SQL keywords or special symbols [2].

Nowadays, the majority of approaches had addressed the problem of SQL injection attack from a centralized perspective, such as the one described by [3] and [2]. However, the solutions are limited to solve only a part of the problem. Regarding this, other approaches had implemented strategies based on intrusion detection systems in order to block a SQL injection attack, such as [4] and [5]. These proposals have as main drawbacks the highest error rate and a limited capacity of learning and adapting when changes occur in the patterns of attacks.

Our proposal aims the SQL injection attacks in a distributed, dynamic and flexible mode. This proposal is founded in a hierarchical multiagent architecture using agents based on the BDI (Belief, Desire and Intention) model [6]. Agents are typically integrated into multiagent systems or agent societies, exchanging information and resolving problems in a distributed way [7]. Agents can be characterized through their capacities such as autonomy, reactivity, pro-activity, social abilities, reasoning, learning and

mobility [6]. Our proposal incorporates classification mechanism (CBR) [8] that includes a making short term predictions [9]. Our multi-agent SQL injection attack, because it is designed for environments.

The rest of the paper is structured as follows: prompted most of this research work. Section 2 architecture, the different levels of the architecture between the agents; section 4 communication between the classifier agent. Finally, agent has been tested inside a multi-agent system

2 SQL Injection Attacks Description

The impact of a SQL injection attack in a database the organization and individuals. Personal, financial promised when this type attack is carried out. when a hacker changes the semantic or syntactic SQL keywords or special symbols on the original executed at the database layer of an application [10] produce unauthorized handling of data, retrieval the worst possible case, taking over control of application convenient of the SQL injection attack is the biggest agents can be extremely complex due to the high number, thus making their detection very difficult.

Some approaches based on firewall and intrusion effective due the strategy of detection, which requires Other approaches more specific to face SQL injection technique of string analysis, some carrying out static Analyzer) [3]. Other more complex using dynamic (Analysis and Monitoring for Neutralizing SQL approaches generally have as main drawback that a moreover the approaches based on models for detection very sensitive. With only slight variations of accuracy of false positive and negatives.

Several approaches based on artificial intelligence novel alternative. Web Application Vulnerability analysis uses a black-box technique which includes a machine presents an IDS approach which uses a machine learning of legal transactions. These transactions are used for monitoring and classifying malicious accesses. Rieth application layer using an anomaly detection model. In use of a recurrent neural network (RNN). The detection serial prediction problem. Generally, this approaches detecting a large number of false positive and false negative systems, they are unable to recognize unknown attack nature database that requires a dynamic updating.

The series "Advances in Soft Computing" contains publications on various areas within so-called soft computing which include fuzzy sets, rough sets, neural networks, evolutionary computations, probabilistic and evidential reasoning, multi-valued logic, and related fields. The publications within "Advances in Soft Computing" are primarily textbooks and proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

Juan M. Corchado • Sara Rodríguez • James Llinas • José M. Molina (Eds.)

International Symposium on Distributed Computing and Artificial Intelligence 2008 (DCAI 2008)

The International Symposium on Distributed Computing and Artificial Intelligence is an annual forum that brings together ideas, projects, lessons, etc. associated with distributed computing, artificial intelligence and its applications in different themes. This meeting has been held at the University of Salamanca from the 22th to the 24th of October 2008. The technology transfer in this field is still a challenge and for that reason this type of contributions has been specially considered in this edition. This conference is the forum in which to present application of innovative techniques to complex problems. The artificial intelligence is changing our society. Its application in distributed environments, such as the Internet, electronic commerce, mobile communications, wireless devices, distributed computing, and so on is increasing and is becoming an element of high added value and economic potential, both industrial and research. These technologies are changing constantly as a result of the large research and technical effort being undertaken in both universities and businesses. The exchange of ideas between scientists and technicians from both academic and business areas is essential to facilitate the development of systems that meet the demands of today's society.

This symposium has evolved from the Iberoamerican Symposium on Distributed Computing and continues to grow and prosper in its role as one of the premier conferences devoted to the quickly changing landscape of distributed computing, artificial intelligence and the application of AI to distributed systems. This year's technical program is extremely strong and diverse, with contributions in both established and evolving areas of research. Submitted papers came from over 16 different countries, representing a truly "wide area network" of research activity. The DCAI technical program includes 88 papers (74 long papers, 12 short papers and 2 doctoral consortium) selected from a submission pool of 142 papers, from 16 different countries.

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