A Comprehensive Survey of Event Analytics

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ABSTRACT

Analytics has emerged as an important area of study as it avoids further incidents or risks after the events have occurred; this is done by analysing computer events and making further statistics. The purpose of this survey is to gain knowledge for the authors' own event knowledge database which will consist of how unusual events work and how they are related to other events. The algorithms mentioned in this paper have been used to build their future development, resulting in a knowledge database designed to be similar to an internet browser engine where it can search events and their relationships. The research and algorithms have helped the authors to decide on the technology they will be using for the knowledge database.

Keywords: *Analytic, Event, Forensic, Monitoring, Security, Surveillance*

1. INTRODUCTION

An event is an occurrence within a computer system that converses with other systems or users. Computer and network systems contain event logs that holds enormous amount of data. These event logs hold records of any behaviors or actions a network device performs. Events may also involve illegal activities such as malicious attacks or unexpected data movement. The plan is to assemble these events and to examine their relationships with research and recording each activity into a knowledge database. This information will help avoid further incidents or risks after events have occurred.

Event analytics is a complex scheme therefore we have created subcategories for our research. We divided this into four major components: computer event surveillance, computer event monitoring, computer event forensic and computer event security. In this paper, we have combined computer event surveillance and computer event monitoring together and computer event forensic and computer event security together shown on Figure 1. An extensive research was conducted throughout these subcategories. We have selected the articles written by professionals in their respected fields.

This paper will be divided into four sections: Section 2 will be on state of the arts,

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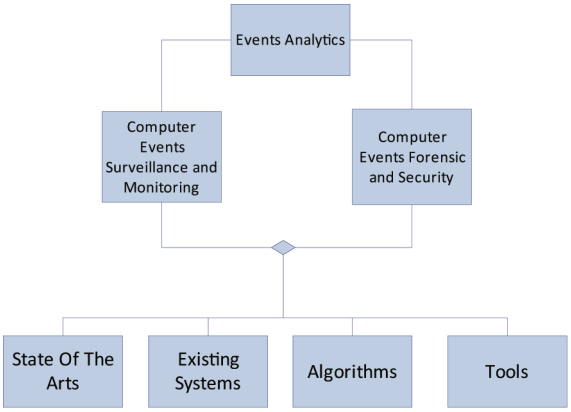
Figure 1. Structure of event analytics



which is the highest level of development or technique at this time, a range or systems and techniques will be introduced here. Section 3 will be on existing systems and algorithms. Section 4 will then be the conclusion that will encapsulate our insights on what was useful and what we have learnt from this research.

2. THE STATE OF THE ARTS

This section covers the highest level of development of computer analytics; it includes topics such as computer surveillance systems, computer forensic events, monitoring events and network events security related methodologies, which are currently being employed. This section contains up to date ideas and knowledge of computer analytics, which can help to make advancements in already existing methodologies.

2.1. Event Based Surveillance and Monitoring

In surveillance, events retrieved from video, audio and image sensors (Bolderheij, Absil, & Genderen, 2005; Gonzalez, 2007; Guennoun, Khattak, Kapralos, & El-Khatib, 2008; Bouhats, Marebati, & Mokhatr, 2007). The purpose does not focus mainly on event detection; instead it focuses more on the event itself. In order to improve unusual event detection, all events must be analyzed individually and categorized based on type. The events are stored in a database to compare relationships for future use, so it can be retrieved when needed. If all events that are recorded and examined are logged into a database it can be used as an event library.

By collecting these events we can examine the reasons of occurrence in which comparisons can be made so as to what events are normal and which ones are not. The application is very similar to youtube and is made to be used by anyone so using the application for the first time should be straight forward (Hameed & Abdullah, 2008; Hannemann, Donohue, & Dietz, 2007; Kieran & Yan, 2010).

Multi-agent event monitoring system is a hybrid, artificial intelligence based event monitoring system. This system aims to assist the network administrators to keep track in computer intrusion detection.

Event monitoring is one of the key parts of a systematic defense (Biblin, Muller, & Pfitzmann, 2006). When event monitoring is mentioned it would always relate to intrusion detection, these two are inseparable. There are many event monitoring approaches being used today and from our research some are ineffective (Zeng, Lei, & Chang, 2007; Woda