

Chapter 6

Cloud-Based Predictive Intelligence and Its Security Model

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ABSTRACT

Predictive computing is a relatively new area of research. Predictive computing helps people to predict the future or unknown events. It combines various statistical approaches like predictive analytics, predictive modeling, data mining, big data, and machine learning. Predictive computing uses current and historical facts to predict future events. It looks for relationships and patterns between data variables. The outcomes of data variables can be predicted if we know the values of explanatory variables. Cloud computing is another new technology that provides everything-as-a-service (XaaS) and is used widely in various businesses. All storage and computing devices use cloud platform due to its elasticity, scalability, and dynamicity. Cloud-based predictive computing is a technology that uses data available on the cloud. Presently, the data from the social sites (e.g., Facebook, Gmail, LinkedIn, election data, etc.) are stored on cloud, and the volume of this data is enormous which needs innovative predictive computing design and architecture. This chapter represents the cloud-based predictive intelligence and its security model. Architecture for predictive intelligence is proposed and compared with the existing models. An attack prediction algorithm is also proposed and compared for the accuracy in the predictive intelligence.

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INTRODUCTION

Cloud Computing

The concept of cloud computing came into the picture since 1960 by work of researcher John McCarthy. McCarthy's work was dedicated to making cloud computing a public utility which would benefit the society in whole. This idea of McCarthy's idea was further carried ahead by Douglas Parkhill. Douglas Parkhill explored the characteristics of cloud computing in his book "The Challenge of Computer Utility" in 1966 (Kaufman, 2009). The term 'cloud' roots back in the telecommunication world, where the telecommunication companies started offering reasonable quality VPN services at lower cost. Before VPN, the telecommunication service providers provided dedicated point-to-point data circuits. These dedicated point-to-point data circuits resulted in the wastage of network bandwidth. Using VPN services enables the switching of traffic to balance the utilization of the overall network. Cloud computing extends this concept to servers and network infrastructure (Jadeja & Modi, 2012). Big players in this industry have already dived and had successfully implemented cloud computing, be it Amazon, IBM, Google or other smaller companies, all are shifting their computation base to the cloud.

Internet has changed computing in a radical way from its initial days to the present day. Cloud computing has emerged in leaps and bounds since the dawn of internet in the past decade. A large number of facilities of prevalent computing are now provided over the internet. These facilities have led to the shifting and evolution of the concept of parallel computing, to grid computing, to distributed computing, and currently to cloud computing. The notion of cloud computing has been around for quite some time, but it is still an emerging field of computer science. It has spread to wide range of facilities provided over internet. Technically, cloud computing may be defined as computing environment where the computing needs of one party can be outsourced to another party via internet (NIST, 2018). There are many advantages of cloud computing, the most important is that an end user need not to invest in any infrastructure and hence not for installation. Since there is no such infrastructure or installation, no manpower is required to handle or maintain the infrastructure, which leads to a tremendous reduction in cost. Other advantages include: easy management, uninterrupted service, disaster management, green computing to name a few.

The National Institute of Standards and Technology (NIST) provides the definition of cloud computing, which says that:

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (NIST, 2018)

In cloud computing, service is requested from the cloud, and the end user is not required to know the configuration and the physical location of the system which is delivering the services requested. It deals with computation resources, software, Platform and data storage services (Satish, Manjunath, & Hegadi, 2017). Cloud computing moves the data and related computing away from the personal computers to large data processing centers. Cloud computing combines all distributed resources and makes optimal use of resources to be able to solve significant computation problems and aims for higher throughput. Cloud computing deals with virtualization, scalability, interoperability, quality of service and the deliv-

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