BIOMETRIC MULTI-FACTOR AUTHENTICATION SCHEME IN CLOUD COMPUTING

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Abstract: The biometric Multi-Factor authentication represents the next generation computing authentication infrastructure. This paper proposes a novel multi-factor authentication scheme based on biometrics concepts. Biometrics is a process used to identify or authenticate an individual’s identity using any of a series of physical or behavior characteristics. Interconnecting biometric technologies with cloud infrastructure improves speed, secure communication, scalability, identity and access management, reliability, automation.

Keywords: biometric, Cloud computing, security, authentication methods, authorized user

Introduction

The word “biometrics” comes from Greek: bio (life) and metric (to measure). The biometrics authentication refers to identification of humans by their characteristics or traits [1].

In 1870 Alphonse Bertillon developed “Bertillonge” (anthropometrics). This was a method for identifying individuals based on detailed records of their body measurements, physical descriptions and photographs [2].

The biometrics systems offer essential benefits in the cyber space and improve the security mechanism.

A biometric identifier is a physiological or behavioral characteristic of the person. This technology represents a unique method for recognizing individuals [3]. The characteristic are shown in figure 1.

The physiological biometrics is based on measurements (fingerprint, iris-scan, facial recognition, hand geometry) and behavioral characteristics (signature-scan, keystroke-scan, voice recognition).

In recent years, many business, including many retailers and government agencies, have been testing different forms of biometrics. This paper refers to interconnected biometric techniques and cloud computing for multi-factor authentication.

Cloud computing is described as a model for enabling ubiquitous, convenient, on-demand network access to shared pool of configurable computing resources [6]. Figure number two represents the NIST definition of cloud computing.

Figure 1. Physiological and behavioral characteristics

Figure 2. NIST- Cloud Computing

It provides three different service modal. Software as a Service (SaaS) that provide any software running on the cloud infrastructure. In Platform as a Service (PaaS) capability provided to the consumer is to deploy anything onto the cloud infrastructure anything. Infrastructure as a Service (IaaS) facilitates the user by providing storage, networks, and other...
proposes a new model of security system, users biometric security in Cloud Computing. The paper Pugazhenthi et al. (2013) describe a multiple (Hannah, 2005). expensive and cameras too large for small ATMs adopt scanning because the systems were tested ATMs with iris scans, but banks have yet to Diebold, a large producer of security software, has Motor Vehicles (2011). face recognitions technology in its Department of United States, Illinois was the first state that used doors of the school will open. students must first stare into a box before the Avenue Elementary School in the United States, implemented in a variety of systems. At Park Biometric technologies are already being extracted technology. In 1988, the Lakewood Division of the Los Angeles County Sheriff's Department began using composite drawings of a suspect to conduct a database search of digitized mugshots [2]. Biometric technologies are already being implemented in a variety of systems. At Park Avenue Elementary School in the United States, students must first stare into a box before the doors of the school will open. United States, Illinois was the first state that used face recognitions technology in its Department of Motor Vehicles (2011). Diebold, a large producer of security software, has tested ATMs with iris scans, but banks have yet to adopt scanning because the systems were expensive and cameras too large for small ATMs (Hannah, 2005). Pugazhenthi et al. (2013) describe a multiple biometric security in Cloud Computing. The paper proposes a new model of security system, users are to provide multiple biometric finger prints during Enrollment for a service [4]. An important current solution was proposed bySelvarani et al. (2015). This study presents a multi-modal bio-cryptographic authentication in cloud storage sharing for higher security, using fingerprint and Iris biometric technology. The Multi-Factor authentication scheme Building the cloud security infrastructure with biometric technology will secure the data from unauthorized users. In the virtualization space, the development of more authentication mechanism has become a demand, especially when cloud computing technology is used. This paper proposes interconnecting biometrics and cloud innovation, to take network users to the next level and improve the authentication mechanism. As security is the main concern in using cloud computing fused biometric authentication techniques, which can be secure and reliable. The article concentrates on a multi-factor scheme in cloud computing using biometrics authentication scheme. Theoretically, biometrics is a great way of authenticating a user. The idea of this paper starts from Frong, Zhuang and Fister (2013). The authors describe an image-based, biometric authentication model for hand gestures captured by video recording [9]. The gestures serve as what the authors refer to as a “biometrics password” and provide context for biometric feature extraction and biometric matching based on the “hand shape and the postures in doing those signs” [10]. Figure three represents a biometric method for authentication.

**Figure 3. Gesture authentication [9]**

The proposed multi-factor authentication scheme is centered on the iris scans, finger prints and gesture authentication in cloud computing, with three levels of security. Iris scans are highly accurate and require low storage space. Iris scanning identifies the feature of the eye’s iris. This is one of the most promising biometric tools. A digital camera captures an image of the eye and registers unique patterns found in each person’s
In the United States, iris scan technology is used at secure government installations and high-tech corporate headquarters. In China, this biometric method is preferable than the fingerprint because customers feel that an iris scan is more sanitary. Fingerprints have been used in forensics for more than 100 years. This technology is incorporated into many firms as a payment mechanism or to verify employee attendance. In hospitals, it has been used to access control medicines and drugs. The gesture method represents an innovative mechanism. This method is based on “sequence of hand signs”. Those representing the letters “i”, “l”, “o”, “v”, “e”, and “u” can be encoded as a series of gesture image and used to authenticate the claimed identity of the individual. Figure four shows the novel biometric multi-factor authentication scheme. The scheme is centered around of biometrics mechanism: iris scans, fingerprints and gesture scans. This mechanism secures authentication in the Cloud using three biometric level of security. The first biometric level of security is iris scan, the second level is fingerprint and the last one is gesture scans. The workflow of the scheme starts from the security officer and pass throw a firewall and three security levels for authentication in cloud. By interconnecting cloud with biometrics methods a security communication tunneling is obtained. Biometrics increased security in cloud computing. The security officer enrolls with the biometrics characteristics provided by a cloud. Once the identity is registered, the biometric authentication details are stored in cloud service provider database. The fourth security level, gesture scan, represents a cryptographic method to achieving secure authentication. In the Fong, Zhuang, and Fister’s model, each hand sign is associated with one character, a letter of the alphabet.

**Figure 4.** Biometric Multi-factor scheme

**CONCLUSIONS**

In this paper we have presented a novel multi-factor authentication scheme based on biometrics innovation for secure authentication in cloud. The first part of the paper presents a descriptive introduction of the cloud computing and biometrics methods. The second part is a review of current solution, used by organizations. The third part of the article represents the proposed multi-factor authentication scheme in cloud. This scheme presents innovative benefits, like on-demand secure communications, scalability, secure authentication, automation, identity and access management, efficient costs, high reliability, elasticity. The result of this study can overcome some of the limitations of using a single biometric technology. The combination of those innovation secured data from unauthorized users in cloud environment.
BIBLIOGRAPHY


