UMass | Dartmouth
COLLEGE OF ENGINEERING

MASTER'S THESIS (SPRING 2014)

TOPIC: *Embedding Digital Signatures as Invisible Watermarks in Cloud-Based Critical Data*

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ABSTRACT

Due to the much reduced cost of hardware and software maintenance using cloud services, storing data in clouds has become a common trend for modern users. Although cloud-based storage services provide users many advantages including easy and flexible data accessibility, data security has become a major concern when critical and sensitive data such as a patient's medical records is stored in clouds. To alleviate this concern, in this thesis, we propose a security mechanism to protect critical and sensitive data stored in clouds. Different from our previous efforts on securing critical data in clouds using multiple digital signatures, our new approach does not require storing multiple digital signatures in separate files; instead, it supports embedding multiple digital signatures as invisible watermarks in cloud-based critical data. The proposed approach can be used to authenticate the identities of multiple signers of a document, and to ensure that the original content of the document is not changed in clouds. To demonstrate how our approach works, we adopt medical images (e.g., an x-ray image) as critical data and design embedding algorithms to hide multiple digital signatures as an invisible watermark in the image to be protected. To seamlessly embed the watermark in an image, we use the Least Significant Bit (LSB) approach to store the digital signature information in the pixels of a selected area from the image. In our implementation, a prototype medical system is developed to allow multiple users to digitally sign x-ray images, and upload or download them at cloud storages such as the Google cloud storage supported by Google App Engine.