Abstract

Mohamed M. Emara

Secure Binary Codes Using A Siamese Twin Random Projection Neural Network

Online and cloud storage has become an increasingly popular location to store personal data. Content Based Image Retrieval systems are one of the systems that are starting to experience technical difficulties in handling large image data that is being uploaded to online storage. This problem can be summarized into three much related problems Storage problem, Retrieval problem and Security problem. To overcome the security concerns, some randomizing-dependent techniques and encryption algorithms were introduced, but without fixing storage and retrieval concerns. As for the other concerns, hashing techniques were used for fast storing and retrieval of data but also with neglecting security concern. In this thesis a new technique is proposed that uses both randomizing and hashing techniques in a joint structure. This technique takes in consideration all the concerns without neglecting anyone of them. The proposed structure uses a Siamese-Twin architecture neural network that applies random projection on data before being used, and it also produces a binary compact code as an output with a reduction rate varies from 0.21 to 0.85 compared to original size. Furthermore, Particle Swarm Optimization and Genetic Algorithms are used to fine-tune the Siamese-Twin neural network to overcome some of hashing techniques methods. A new feature extraction technique was also introduced that is created by merging different feature extraction techniques. This technique can proved accuracy that is better than other state of art feature extraction techniques. The proposed technique produces a more compact output with better retrieval performance than encryption algorithms and randomizing technique. It also provides a precision that is almost as good as other hashing techniques but with better security measures that exceed that of hashing techniques.