Secure Iris Recognition

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Introduction

-Goal: protect users' private biometrics info and identify them using their ciphertext.

- Biometrics needs to tolerate small changes. It becomes impossible to directly encrypt the representative code.

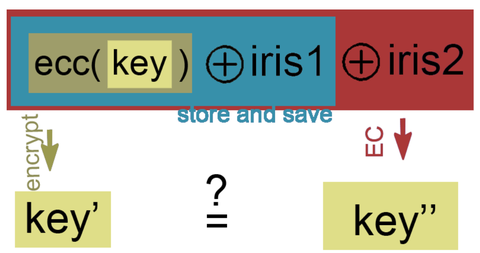
-Using an iris recognition system as our basis, we explored alternative options for secure biometrics methods.

Methods

1. XOR-ECC Method

- Logical operations (XOR) used to hide the iris information with a randomly generated key.
- Error correction code (ECC) used to recalculate the original key, which is used for hashing and identification.

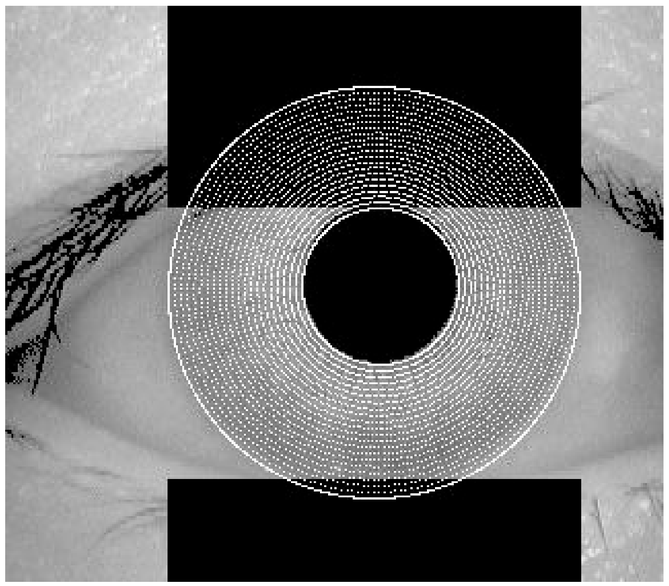
-Based on work by Hao et. Al, University of Cambridge



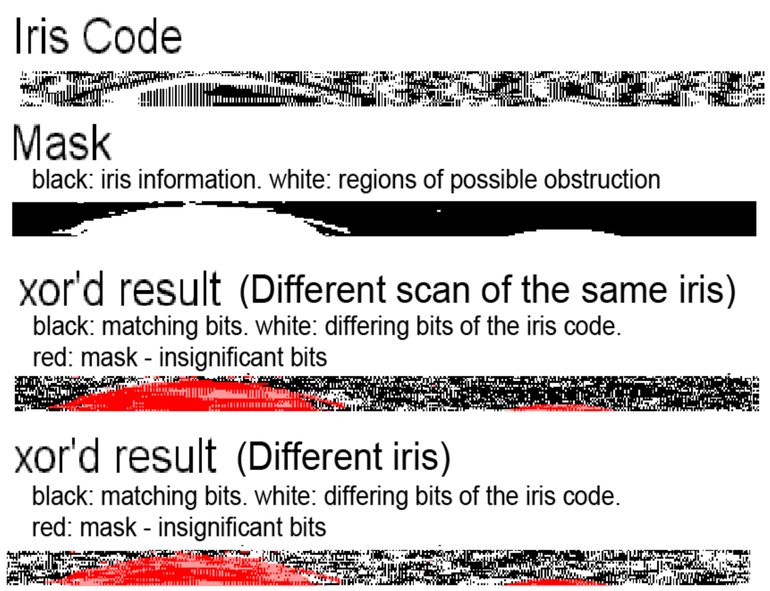
2. Random Projection

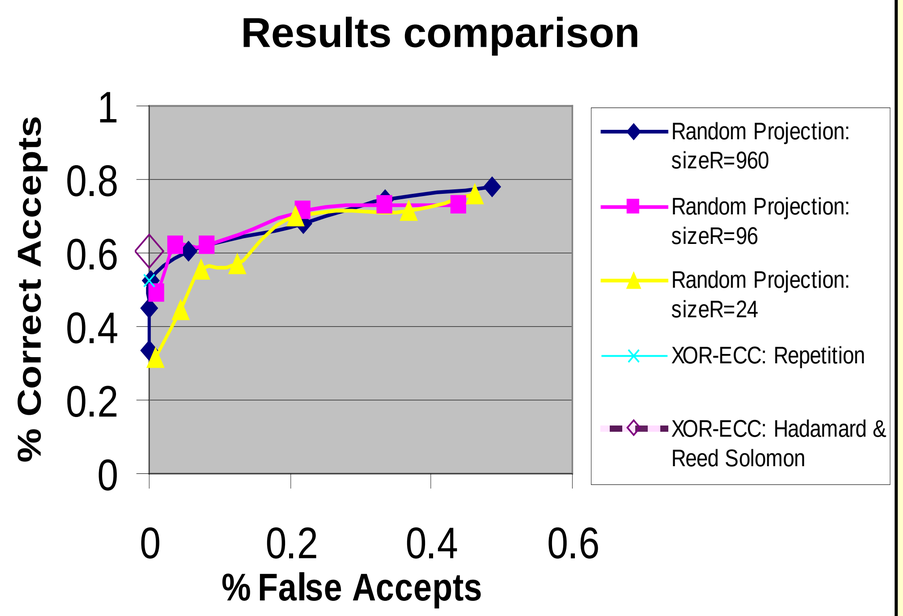
- Random projections used to reduce dimensionality of the iris information, while preserving the distances.
- Vectors are random, so original values are hidden and secure.
- Used the resulting distance to determine possible match.

Results



-Segmented iris scan used to generate iris code.
- Black areas indicate areas of possible iris obstruction





- R: encryption matrix used in random projection.

Conclusions

- Examined the influence of error correction applied to the XOR-ECC method. Hadamard & Reed Solomon has the highest rate of correct accept (60%) and reject (100%).

- Accuracy of random projection increases as the size of the encryption matrix does, but also reveals more information about the original iris.

- Speed of random projection is 31 times that of the XOR-ECC method; there is promise for future research.

- Decreasing the key size leads to less complexity, increased correct acceptance rate, and decreased correct rejection rate.

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