FACULTY OF **SCIENCE**

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PERSONAL AUTHENTICATION AND HUMAN ACTIVITY RECOGNITION FROM VIDEO

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MOTIVATIONS

- There is a growing installation of surveillance cameras in private and public areas all over the world.
- In China, both Beijing city and Guangzhou city have installed more than 250 thousands cameras, which generate 12 million hours of video footage everyday, just from 2 major cities.
- In turn, there is an increasing demand of automatic understanding of events occurring in a scene monitored by surveillance cameras.

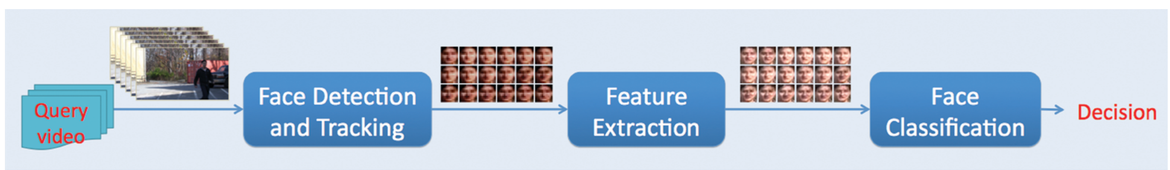
GOALS AND OBJECTIVES

- To develop a secure human identification algorithm from low quality video
- To develop algorithms which could able to recognize human activity
- The long-term goal is to develop an intelligent video processing system which could authenticate people, understand human activity and identify abnormal event

1. FACE RECOGNITION FROM VIDEO

Key research issues

- Detect and track face region from low quality video
- Recognize low quality face images
- How to fully utilize multiple face images for recognition?



Tracking small face from low-resolution video with illumination variations [1]

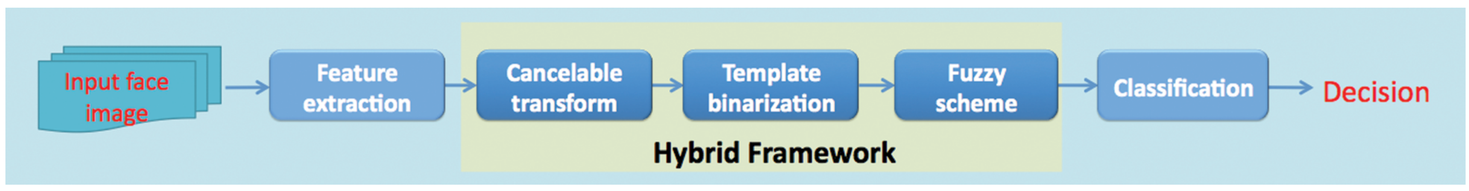
Very low-resolution face recognition [2][3][4]

Enhance multiple images based face recognition by two new measurements [5]

2. FACE TEMPLATE PROTECTION

Key research issues

- generate a secure face template while the recognition accuracy would not be degraded



Three-step hybrid framework [8]
- Cancelability
- Discriminability
- Security

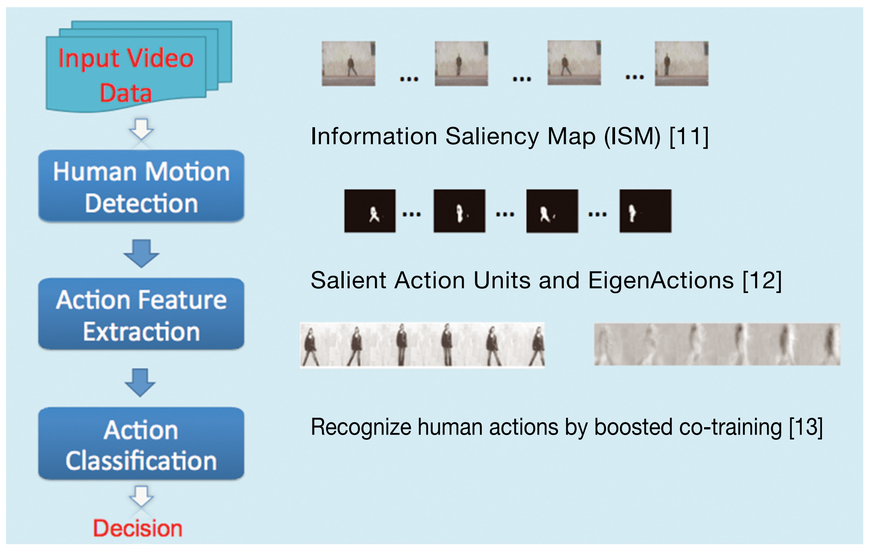
Template binarization: Discriminability-preserving transform [8-10]
- Optimize binary template discriminability
- High entropy binary template

Template binarization: Binary discriminant analysis [6-7]
- Optimize binary template discriminability
- High entropy binary template

3. HUMAN ACTION RECOGNITION

Key research issues

- Human detection from complex background as well as illumination variations
- Representation of human appearance variations
- Modeling complicated human activity



REFERENCES

1. W.W. Zou, R. Chellappa and P.C. Yuen, "Face Tracking in Low Resolution Videos under Illumination Variations", In press, Proceedings of IEEE International Conference on Image Processing (ICIP), 2011.
2. W.W. Zou and P.C. Yuen, "Very Low Resolution Face Problem", submitted to IEEE Trans. on Image Processing, 2011.
3. W.W. Zou and P.C. Yuen, "Learning the Relationship between High and Low Resolution Images in Kernel Space for Face Super Resolution", Proceeding of International Conference on Pattern Recognition (ICPR), 2010.
4. W.W. Zou and P.C. Yuen, "Very Low Resolution Face Recognition Problem", Proceedings of IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS), 2010.
5. W.W. Zou and P.C. Yuen, "Discriminability and Reliability Indexes: Two New Measures to Enhance Multi-image Face Recognition", Pattern Recognition, vol. 43, pp. 3483–3493, 2010.
6. Y.C. Feng and P.C. Yuen, "Binary Discriminant Analysis for Generating Binary Face Template", submitted to *IEEE Transactions on Information Forensics and Security 2011.*
7. Y.C. Feng and P.C. Yuen, "Binary Discriminant Analysis for Face Template Protection", *International Conference on Pattern Recognition (ICPR)*, pp.874-877, 2010.
8. Y.C. Feng, P C Yuen and A K Jain, "A Hybrid Approach for Generating Secure and Discriminating Face Template", *IEEE Transactions on Information Forensics and Security, vol. 5, no. 1,* pp.103-117, 2010.
9. Y.C. Feng and P.C. Yuen, "Class-Distribution Preserving Transform for Face Biometric Data Security", *Proceedings of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), pp.* 141-144, 2007.
10. Y.C. Feng and P.C. Yuen, "Selection of Distinguish Points for Class Distribution Preserving Transform for Biometric Template Protection", *Proceedings of IEEE International Conference on Biometrics (ICB),* pp. 636-645, 2007.
11. C. Liu, P.C. Yuen, and G Qiu, "Object Motion Detection Using Information Theoretic Spatio-temporal Saliency", *Pattern Recognition*, 42(11):2897-2906, 2009.
12. C. Liu and P.C. Yuen, "Human Action Recognition Using Boosted EigenActions", *Image and Vision Computing*, 28(5):825-835, 2010.
13. C. Liu and P.C. Yuen, "A Boosted Co-Training Algorithm For Human Action Recognition", In press *IEEE Transactions on Circuits and Systems for Video Technology*, 2011.