

Invited Overview Session

Session: SP1-1.3
Time: Saturday, December 19, 15:00 - 15:30
Place: Room Y301
Chair: Jay C.C. Kuo, University of Southern California (U.S.A.)

Face Recognition from Low-resolution to High-resolution

Speaker: Kenneth K.M. Lam, The Hong Kong Polytechnic University, Hong Kong

Abstract

A lot of research on face recognition has been conducted over the past two decades or more. Various face recognition methods have been proposed, but investigations are still underway to tackle different problems and challenges for face recognition. The existing algorithms can only solve some of the problems, and their performances degrade in real-world applications. In this talk, we will first discuss the performances of face recognition techniques on face images at different resolution. To perform face recognition, image features from a query image are first extracted and then matched to those features in a gallery set. The amount of information and the effectiveness of the features used will determine the recognition performance. To improve the performance, we will present a face recognition approach using information about face images at higher and lower resolutions, which can enhance the information content of the features that are extracted and combined at different resolutions. As the features from different resolutions should closely correlate with each other, we introduce the cascaded generalized canonical correlation analysis (GCCA) to fuse the information to form a single feature vector for face recognition. To further improve the performance and efficiency, “Gabor-Feature Hallucination” is used to predict the high-resolution (HR) Gabor features from the Gabor features of a face image directly by using local linear regression. We also describe how the algorithm is extended for low-resolution (LR) face recognition.

For recognition of HR face images, we will show that pore-scale facial features can be explored when the resolution of faces is greater than 700x600 pixels. We will describe the use of the facial features for recognition under conditions of different facial expressions, lighting, poses and captured times. We will also present the minimum area in face images that can retain a high recognition level. Experiment results indicate that the facial pores can be used as a new biometric for recognition, even distinguishing between identical twins.

Biography

Kin-Man Lam received the Associateship in Electronic Engineering with distinction from The Hong Kong Polytechnic University (formerly called Hong Kong Polytechnic) in 1986, the M.Sc. degree in communication engineering from the Department of Electrical Engineering, Imperial College of Science, Technology and Medicine, London, U.K., in 1987, and the Ph.D. degree from the Department of Electrical Engineering, University of Sydney, Sydney, Australia, in August 1996.



From 1990 to 1993, he was a Lecturer at the Department of Electronic Engineering, The Hong Kong Polytechnic University. He joined the same department as an Assistant Professor in October 1996, became an Associate Professor in 1999, and has been a Professor since 2010. He has been a member of the organizing committee and program committee of many international conferences. Dr. Lam was also the Chairman of the IEEE Hong Kong Chapter of Signal Processing between 2006 and 2008. Between 2009 and 2013, he was an Associate Editor of IEEE Trans. on Image Processing.

Currently, Dr. Lam is VP-Member Relations and Development of the Asia-Pacific Signal and Information Processing Association (APSIPA), and the Director-Membership Services of the IEEE Signal Processing Society. He serves as an Associate Editor of Digital Signal Processing, APSIPA Trans. on Signal and Information Processing, and EURASIP International Journal on Image and Video Processing. He is also an Editor of HKIE Transactions, and an Area Editor of IEEE Signal Processing Magazine. He is a General Co-Chair of the 2015 APSIPA Annual Summit and Conference and the 2017 IEEE International Conference on Multimedia Expo, both to be held in Hong Kong. His current research interests include human face recognition, image and video processing, and computer vision.