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Network enabled feature search on distributed servers around the world for human identification in video sequences

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The main goal of this research program is to advance knowledge and understanding of human visual perception phenomena for person identification by facial recognition, and to integrate the pattern recognition algorithm with a novel technique for network enabled searches such that individuals could be identified from data distributed around the world. In this work, a generalized feature matrix is created for each new face region, incorporating the effects of different orientations, poses, and illumination. Recognition will be done with an integrated search or comparison to identify the best match with similarly created features in the database. A network-based feature search between multiple servers situated in multiple regions (cities, counties, states and countries) with multiple agencies (police, prosecution, courts and corrections) and multiple offices (Jail, Management, Arrest and Booking) serves the needs of a secure information-sharing system for the case of law enforcement. Fast and automatic recognition of faces from video sequences is an important task for security surveillance. The task is especially difficult since the number, location, size and orientation of human faces may vary from frame to frame. Existing face recognition techniques, which typically require a large set of training images of individual faces for creating a feature database, are not feasible for many applications when these multiple training images in various poses and illuminations may not be available. In fact, the typical scenario is to be able to robustly recognize faces, even though only one or a very small number of training images are available, and these training images were acquired under significantly different lighting and pose conditions. Motivated by human visual perception, which remains robust despite these difficulties, we developed a feature-based face recognition system, largely independent of pose and lighting. A multidimensional feature matrix representing multiple views of an individual is created using face regions detected from images captured by surveillance cameras placed at different locations. A similarity search between this feature matrix and feature vectors in a distributed database will result in the identification of one of its vectors, which represents a face in a particular pose or illumination. In order to accommodate worldwide searches from databases distributed on different servers in a variety of organizations and offices, a network routing technique has been employed and integrated with the search. Based on the sensory attributes of the human visual cortex, a nonlinear enhancement algorithm is also developed for preprocessing the images, such that face regions captured in low or overexposed lighting conditions are improved and made more distinct for feature extraction and representation.

Biography

Vijayan K Asari is a Professor in Electrical and Computer Engineering and Endowed Chair in Wide Area Surveillance at University of Dayton, USA. He is the Director of the Center of Excellence for Computer Vision and Wide Area Surveillance Research at UD. He received his PhD degree in Electrical Engineering from Indian Institute of Technology, Madras. He holds 3 patents and has published more than 500 research papers in the areas of image processing, pattern recognition and machine learning. He received several teaching, research, advising and leadership awards. He is a Senior Member of IEEE and SPIE.

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