



Fall 2010 Colloquium
Temple University
Computer and Information Sciences

Supervised and Semi-Supervised Image Alignment

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Abstract:

The first part of the talk will give an overview of the various intelligence video projects being developed at the Visualization and Computer Vision Lab of GE Global Research. The second part of the talk presents a discriminative framework for supervised image alignment. Although conventional generative model based Active Appearance Models (AAM) have achieved some success, they suffer from the generalization problem, i.e., how to align any image with a generic model. We treat the iterative image alignment problem as a process of maximizing the score of a trained two-class classifier that is able to distinguish correct alignment (positive class) from incorrect alignment (negative class). During the modeling stage, given a set of images with ground truth landmarks, we train a conventional Point Distribution Model (PDM) and a boosting-based classifier, which we call Boosted Appearance Model (BAM). When tested on an image with the initial landmark locations, the proposed algorithm iteratively updates the shape parameters of the PDM via the gradient ascent method such that the classification score of the warped image is maximized. The proposed framework is applied to the face alignment problem. We experimentally show that, compared to the AAM-based approach, this framework greatly improves the robustness, accuracy and efficiency of face alignment. We will also present an extension to BAM, which utilizes a ranked learning scheme to ensure that a convex alignment cost surface is obtained. Finally I will present a number of recent advance in semi-supervised image alignment. Parts of this talk have been published in several vision conferences and journal, including BMVC 06,07, CVPR 07,08,09, ICCV 07,09, ECCV 10, IVC, and PAMI.

Bio:

Dr. Xiaoming Liu is a research scientist at General Electric (GE) Global Research. He received the B.E. degree from Beijing Information Technology Institute, Beijing, China and the M.E. degree from Zhejiang University, Hangzhou, China, in 1997 and 2000 respectively, both in Computer Science, and the Ph.D. degree in Electrical and Computer Engineering from Carnegie Mellon University (CMU), in 2004. His research interests include computer vision, pattern recognition, and machine learning, with a recent focus on facial image processing in the context of surveillance videos. At GE, he was the PI for the current NIJ "Site-Adaptive Face Recognition at a Distance" program and the project leader of the BIRD "ID Kiosk" program. He has lead the execution of the NIJ "Active 3D Face Capture" program and was the main contributor of the NIJ "High Quality 3D Facial Images from Surveillance Video" program. He has authored more than 50 peer-reviewed scientific publications, and has over 10 U.S. patents pending.