Announcing the Final Examination of Enrique Ortiz for the degree of Doctor of Philosophy

Time & Location: March 11, 2014 at 9:00 AM in CREOL 102
Title: Taming Wild Faces: Web-Scale, Open-Universe Face Identification in Still and Video Imagery

With the increasing pervasiveness of digital cameras, the Internet, and social networking, there is a growing need to catalog and analyze large collections of photos and videos. In this dissertation, we explore unconstrained still-image and video-based face recognition in real-world scenarios, e.g. social photo sharing and movie trailers, where people of interest are recognized and all others are ignored. In such a scenario, we must obtain high precision in recognizing the known identities, while accurately rejecting those of no interest.

Recent advancements in face recognition research have seen Sparse Representation-based Classification (SRC) advance to the forefront of competing methods. However, its drawbacks, slow speed and sensitivity to variations in pose, illumination, and occlusion, have hindered its wide-spread applicability. The contributions of this dissertation are three-fold:

1. For still-image data, we propose a novel Linearly Approximated Sparse Representation-based Classification (LASRC) algorithm that uses linear regression to perform sample selection for l1-minimization, thus harnessing the speed of least-squares and the robustness of SRC. On our large dataset collected from Facebook, LASRC performs equally to standard SRC with a speedup of 100-250x.

2. For video, applying the popular l1-minimization for face recognition on a frame-by-frame basis is prohibitively expensive computationally, so we propose a new algorithm Mean Sequence SRC (MSSRC) that performs video face recognition using a joint optimization leveraging all of the available video data and employing the knowledge that the face track frames belong to the same individual. Employing MSSRC results in a speedup of 5x on average over SRC on a frame-by-frame basis.

3. Finally, we make the observation that MSSRC sometimes assigns inconsistent identities to the same individual in a scene that could be corrected based on their visual similarity. Therefore, we construct a probabilistic affinity graph combining appearance and co-occurrence similarities to model the relationship between face tracks in a video. Using this relationship graph, we employ random walk analysis to propagate strong class predictions among similar face tracks, while dampening weak predictions. Our method results in a performance gain of 15.8% in average precision over using MSSRC alone.

Major: Computer Engineering

Educational Career:
Bachelor's of Computer Engineering, BS, 2007, University of Central Florida
Master's of Computer Engineering, MS, 2009, University of Central Florida

Committee in Charge:
Mubarak Shah, Chair, Electrical Engineering and Computer Science
Rahul Sukthankar, Google Research
Niels da Vitoria Lobo, Computer Science
Xin Li, Mathematics
Jun Wang, Electrical Engineering

Approved for distribution by Mubarak Shah, Committee Chair, on February 10, 2014.
The public is welcome to attend.