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present

"Person Reidentification by Deep Structured Prediction"

given by **Dr. Chengcui Zhang**

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Public Invited

Visual-appearance-based person reidentification (re-ID) is the task of assigning the same identifier to all instances of an individual in a series of images or videos, even after the occurrence of gaps over time or space. Applications of person re-ID include person association for long-term tracking in large video surveillance networks, reidentification of persons of interest with unmanned autonomous vehicles (UAV) from various on-board camera views, and person-of-interest retrieval in multimedia forensic databases. Due to changes in camera view, illumination, body pose, and occlusion, among others, it is extremely challenging to separate the false positives from the real person of interest while accommodating appearance variations of the same person of interest. The current state-of-the-art methods for person re-ID can be categorized into two main approaches: Given a gallery set with known IDs, the task is to infer either the ID label of a probe image (person re-ID via image retrieval) or the collective ID labeling of all probe images simultaneously in a probe set (person re-ID via a highly crafted re-ID structure).

Instead of treating each person image individually, as in conventional image retrieval, or handcrafting the graph topology for the re-ID structures, we have developed a new approach, which is based on deep structured prediction, to learn and to infer an unknown re-ID structure that models the structural interactions of person images in the output label space. In addition, a new research direction is identified in generating structure samples to circumvent the chicken-and-egg problem of rediscovering the unknown re-ID TRUE structure from structure samples that should be drawn from a known re-ID TRUE structure. We further instantiate the baseline formulation into a novel learning paradigm in two dimensions. First, neural-style-transfer-based structure sampling (NSTSS) is proposed for preventing information loss in a randomized dropout approach while remaining aligned with the styles of person appearance variation in the gallery set. Second, we fully parametrize the energy function using structured prediction energy networks to improve the expressivity of the re-ID structure with a minimal number of domain expert priors. This new approach outperformed all the other existing image retrieval approaches on two popular benchmark datasets, thereby demonstrating that the final re-ID structure with possible high-arity interactions can be identified via structured prediction energy networks among structure samples of higher quality that have been rendered by NSTSS.

Chengcui Zhang received her B.S. and M.S. degrees in Computer Science from Zhejiang University, China, in 1996 and 1999, respectively. She received her Ph.D. degree in Computer Science from Florida International University in 2004. She is currently a full professor of computer science with the University of Alabama at Birmingham (UAB). She works in the broad areas of multimedia databases and information retrieval, multimedia data mining and machine learning, multimedia security and forensics, geoinformatics, and applied bioinformatics. She has published more than 160 refereed articles, many at the top tier venues in computer sciences including the IEEE Transactions, the IEEE Multimedia, the ACM Multimedia, IEEE Intl. Conf. on Data Mining (ICDM), ACM Conf. on Communication and Computer Security (CCS), and IEEE Intl. Conf. on Multimedia and Expo (ICME). Her research had been externally supported by US National Science Foundation, NIH, and by awards/gifts from the industry, including IBM, eBay, and Comcast. She was the former chair of IEEE Technical Committee on Semantic Computing and has served as the Conference Program Chair for many IEEE Conferences. She was an Associate Editor of IEEE Trans. on Multimedia and is the current Editor in Chief of International Journal of Multimedia Data Engineering and Management.

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