CO-OP Work Report

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My work at Futurewei Technologies, Inc. includes contributions in three different aspects of a computer vision project. The project focuses on handling personal photo collection albums in smart phones. Firstly, the focus was given on the family albums that only contains members of a single family. Given such album, we designed an approach to assign semantic roles to family members in the album. Those roles were “Father, Mother, Daughter, and Son” assuming that the album does not contain grandparents. To test the proposed approach, I created 15 different family albums of celebrities with different types of familial tree. Each album contained at least 30 images where each one contains at least one family member. We proposed a probabilistic-graph based approach that leveraged the attribute and pairwise features. The attribute features are the Gender and Age information of an individual whereas the pairwise features are the same identity (Face Verification), and kinship information (Parent-Child, and Sibling-Sibling).

In the semantic role assignment approach, the deep network facial features were used to represent the face area however, it does not represent the face accurately in non-profile face cases. To improve the robustness we developed context features to concatenate on the face-only features. Thus, we trained separate Convolutional Neural Networks to recognize the identities using the extended head region, upper half body region and full body region. This way, contextual features can be learned and combined with the face-only features to improve the robustness in non-frontal face cases.

Finally, I worked on detecting strangers in a given family photo collection album. This helps us to remove the strangers in the album and focus on assigning semantic roles to family members with the graph-based approach. In this direction, we use the learned contextual and conventional face-only features to represent each individual. We designed a cascaded approach to remove the outliers. In the first step, the obvious outliers are removed whereas on the second case less obvious outliers are removed. For more appropriate feature space representation, we learn the subspace representing the family album. The Gaussian Mixture Model were used to model the family (inliers). Once the query image is received, it is projected to the subspace and probabilistic likelihood is estimated to detect it as a family member or stranger. If it is found to family member, we update the subspace representing the inliers.