Supplementary Material for "Empirically Analyzing the Effect of Dataset Biases on Deep Face Recognition Systems"

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In this document, we provide additional materials to supplement our main submission. We show that the generalization patterns which we observe for the AlexNet architecture, when biasing the training data to frontal faces as well as in the disentanglement experiment, can also be observed when training with the VGG-16 architecture. In particular, Figure 1 shows that the recognition rate of the biased VGG-16 network drops significantly for faces in an extreme yaw pose (red curve) compared to the unbiased network (blue curve). Figure 2 shows that imposing a strong regularization on the network weights does not improve the DCNNs ability to perform disentanglement.

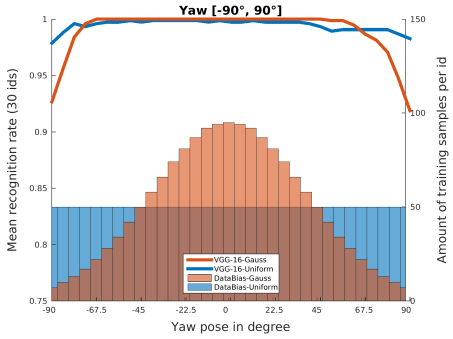
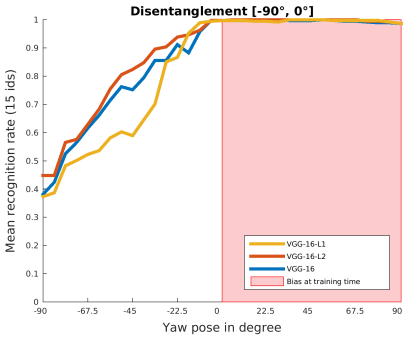
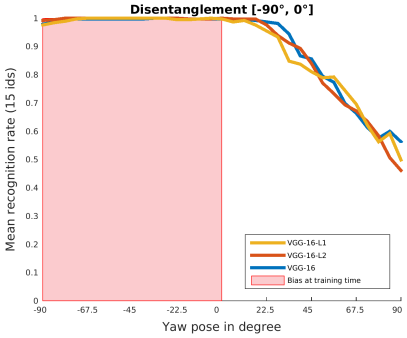


Figure 1: Effect of biasing the training data to frontal faces. The plot shows the recognition rates of two VGG-16 DCNNs as a function of the yaw pose. Both networks were trained on the same amount of images, however, the number of training samples per yaw pose is different. *Blue curve:* TRR: 99.44%; Each yaw pose is equally likely to occur. *Red curve:* TRR: 98.97%; Yaw pose is sampled according to a Gaussian distribution $\mathcal{N}(\mu = 0°, \sigma = 7)$. The unbiased DCNN (blue) has a constant recognition rate along the axis of yaw variation, whereas the recognition rate of the biased DCNN drops significantly for those poses that are underrepresented in the training data.



(a)



(b)

Figure 2: Influence of weight regularization on the ability of VGG-16 to disentangle identity and pose transformation. (a) Left-Identities. (b) Right-Identities. Strongly regularizing VGG-16 with L_1 ($\lambda_{L1} = 0.001$; yellow) or L_2 ($\lambda_{L2} = 0.01$; red) regularization on the weights, does not improve the networks disentanglement ability, compared to the weakly regularized network (blue).