Generating Police Sketches Using a Generative Machine Learning Algorithm

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Sketch artists often produce an unreliable sketch of criminals, causing hundreds of innocent citizens to be imprisoned in the lack of evidence. In this project, I suggest a new approach to facial composite production by introducing the concept of the generative model. I test if involving this concept can generate composites that closely resemble the target face. For implementation, pre-trained GAN (Generative Adversarial Network) generates high-resolution images of human faces. First, GAN produces a randomized series of images. The program accepts ratings from users in terms of its resemblance to the target image, which is passed to a mathematical algorithm that calculates a vector quantity. Produced vector is applied to the GAN model to ensure that the program produces images similar to the pre-produced images with higher ratings. As a result of testing the program with queries, general consistency in image generation was recorded. However, bias in race, gender, and age orientation depending on the dataset used was observed. For instance, Celeb-AHQ successfully produced images of light skinned and dark skinned faces, while failing to produce images of Asian faces. This study shows that involving a generative model can be effective in generating images for criminal investigation. With a careful selection of dataset, depending on the country of usage, and detailed engineering of the program, using a generative model in police sketch production can outperform the existing system and eliminate the issues of innocent citizens falsely accused due to an unreliable sketch.

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