

The paper titled "Analyzing Biases in AU Activation Estimation Toward Fairer Facial Expression Recognition" by Miguel Monares, Yuan Tang, Ritik Raina, and Virginia R. de Sa explores potential racial biases in facial expression recognition models. The study focuses on the disparities in the performance of an action unit (AU) estimation network across different skin tones, using synthetically generated faces. The authors aim to highlight the presence of skin color biases and demonstrate the importance of dataset diversity in developing robust and fair models. They show that biases vary across different action units and skin tones, and these biases interact with dataset differences.

The researchers used Character Creator 4 (CC4) software to generate a synthetic dataset of 940 facial images, manipulating activation levels for ten specific AUs based on the Facial Action Coding Systems (FACS). They trained and evaluated an AU Estimation model derived from a pain-estimation neural network on these synthetic images, revealing significant differences in model performance across skin tones. Paired t-tests showed statistically significant differences in AU and PSPI scores between the lightest and darkest skin tones, indicating skin color bias. Further experiments with models trained on different skin tone ranges (lighter and darker) revealed that the model's performance is influenced by the training data's skin tone distribution.

The findings underscore the complexity of skin color biases in facial expression recognition models and the necessity of diverse and representative training datasets to mitigate such biases. The study suggests that current models may not perform equitably across different skin tones, which could lead to unfair outcomes in applications relying on facial expression recognition. The research emphasizes the utility of synthetic faces for controlled evaluations and highlights the need for ongoing efforts to understand and address biases in AI models to develop fairer and more accurate systems.