Here is a concise 3-paragraph summary of the paper:

<paragraph 1>This paper investigates potential racial biases in facial expression recognition models, specifically an action unit estimation network for pain estimation. The authors created a synthetic dataset of 840 facial expression images that vary only in skin tone across the Monk Skin Tone Scale, while keeping all other facial attributes like expression, morphology, and pose constant. Using this controlled dataset, they conducted experiments to analyze biases in the model's performance across different skin tones. </paragraph>

<paragraph 2>The experiments revealed statistically significant differences in the model's estimation of action unit intensities and pain scores across different skin tones. Notably, the model exhibited diminished performance on darker skin tones compared to lighter ones, suggesting the presence of racial biases. The authors further investigated how training the model on selective skin tone ranges (either light or dark tones) impacted its ability to generalize across the full range of tones. Models trained only on light tones showed decreasing accuracy as skin tones got darker, while models trained on dark tones demonstrated more varied performance changes. </paragraph>

<paragraph 3>The key findings highlight the existence of skin color biases in the action unit estimation network under study. These biases vary across different action units and interact with the biases caused by dataset differences. The paper emphasizes the importance of dataset diversity and understanding the basis of these combined biases to eventually remove them from facial expression recognition models, working towards fairer and more accurate AI systems. </paragraph>