Development of Software for Mental Illness Diagnostics: Facial Expression Classification through Machine Learning

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Emotional facial expression is an aspect largely observed in identifying symptoms relating to depression, anxiety, and bipolar disorder when searching for evidence underlying what patients experience as the flat effect. To propose an unconventional method to enhance this process of observance in mental illness diagnostics, we investigated how machine learning can be integrated into facial detection algorithms and how it plays a role in the differentiation of basic emotions. Engineering goals involved composing an algorithm that incorporates AlexNet, a type of deep convolutional neural network, that would allow for software to achieve an accuracy level minimum of 90 percent in classifying images of happy or sad expressions. Specifically, we looked to sort images from three main datasets: Google Images, ICML (International Conference on Machine Learning) 2013 “Challenges in Representation Learning: Facial Expression Recognition Challenge,” and JAFFE (Japanese Female Facial Expression). Despite only reaching a 75.39 percent accuracy level during execution - probable confounding variables being data augmentation, resulting in invariance within the neural network, and file type compression loss - this research holds significant potential in the location of biomarkers relating to mental disorders. For example, cross-surveyance can be conducted with other data regarding linguistics, vigilance states, and digitally analyzed electrical activity within the brain. Thus, there exists further application of this research in the treatment of these illnesses, with the implementation of video feed, allowing software to continuously log the emotional state of a subject with minimal guidance by a psychiatrist.

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