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Facial Expression Detection using Machine Learning

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Abstract: *In this project, our aim was to create convolutional neural networks (CNN) specifically designed for recognizing facial expressions. The objective was to categorize each facial image into one of seven emotion types considered in our study. We trained CNN models with varying levels of complexity using grayscale images obtained from the Kaggle platform. Our implementation was based on the Torch framework, and we leveraged the power of Graphics Processing Units (GPUs) to accelerate the training process. Alongside the networks' ability to process raw pixel data, we adopted a novel approach that combined this information with Histogram of Oriented Gradients (HOG) features. This hybrid feature strategy was employed to enhance the models' performance.*

To tackle the problem of overfitting, we employed various techniques, including dropout, batch normalization, and L2 regularization. Additionally, we utilized cross-validation to identify the optimal hyperparameters for our models. To evaluate the effectiveness of our models, we closely examined their training histories and performance metrics.

Furthermore, we explored the visualization of different layers within the network to gain insights into the facial features learned by the CNN models.

In summary, our project focused on developing specialized CNN models for facial expression recognition. We experimented with different model complexities, feature strategies, regularization methods, and visualization techniques to achieve accurate classification of facial emotions.

Keywords: Facial Expression

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