Brown CS1430: Computer Vision - Professor Srinath Sridhar

Group Members: Felicity Hade, Austin Lang, Andrew Kirk, Edward Yan (Not Capstoning Class)

Capstone Project Abstract:

As communication with Artificial Intelligence becomes increasingly common, it is important to highlight the importance of human emotion in effective communication. One of the primary ways in which emotions are conveyed is through facial expressions. In order to mitigate this communication barrier, we trained a collection of convolutional neural networks to perform facial expression recognition which would allow an AI to recognize the mood of the human user. In our first model, we utilized the SE-ResNet architecture outlined by Zi-Yu Huang's team in their 2023 Report[1]. We trained this model from scratch using the FER-2013[2] dataset, which consists of roughly 36,000 images belonging to seven different emotion classes. Two other models (Inception-V3 and VGG-16) utilized pretrained weights based on training performed on the ImageNet dataset along with untrained custom classification heads for each model. Both of these models and their classification heads were then trained on FER-2013. We managed to achieve an accuracy of over 63% for the SE-ResNet model as well as accuracies of 67.15% and 64.06% for Inception and VGG respectively. Through the use of feature mapping and other visualization techniques, we also obtain valuable information regarding the impact of various facial features on emotion perception.

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[1] Zi-Yu Huang, Chia-Chin Chiang, Jian-Hao Chen, Yi-Chian Chen, Hsin-Lung Chung, Yu-Ping Cai, and Hsiu-Chuan Hsu. A study on computer vision for facial emotion recognition. Scientific Reports, 13(1):8425, May 2023
[2] Manas Sambare. (2020 Last Updated). FER-2013. Retrieved 4/5/2024 from https://www.kaggle.com/datasets/msambare/fer2013/data.