

Proposal for DSPRO2 (FS24) – Emotion recognition through facial expressions

Group Members

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Short Project Description

This project aims to develop a machine learning model capable of detecting and interpreting human emotions in real-time from a live camera feed. The model will analyze facial expressions to identify emotions such as happiness, sadness, anger, surprise, fear, neutral and disgust.

Our model can help businesses in the film, TV, and advertising sectors. It does this by tracking how people react emotionally while watching their content. This information is very useful for market research and can help make their products better. It's like having a direct window into what the audience is feeling.

Data Description

We will be using the dataset “Expressions in the Wild” which contains a folder with 91’793 colourful images in various sizes and a separate file with the labels.¹

The labels are as follows:

- image_name
 - Name of the image file
- face_id_in_image
 - Indicates the specific face within the image. There are images with multiple faces.
- face_box_top, face_box_left, face_box_right, face_box_bottom
 - These labels define the bounding box coordinates of the detected face
- face_box_confidence
 - Represents the confidence score associated with the face detection
- expression_label
 - 0: angry, 1: disgust, 2: fear, 3: happy, 4: sad, 5: surprise, 6: neutral

¹ Zhanpeng Zhang, Ping Luo, Chen Change Loy, & Xiaoou Tang. (2015). Learning social relation traits from face images. Retrieved April 12, 2024, from <https://mmlab.ie.cuhk.edu.hk/projects/socialrelation/index.html>

To test the accuracy of our model trained on this data, we are using an AI image generator to create 10 images per expression (total of 70) which will then be annotated by 10 different people.

After that we will use our model on live images from a camera feed and see how well it can detect facial expressions.

Cloud Service Integration

We are planning to use Google Cloud where we get \$300 worth of credits for free. Google Colab which runs on Google Cloud server leverage the power of Google hardware, including GPUs and TPUs but because of limited free usage of said hardware we plan to use this service only for the final large trainings. We also plan to store our datasets on the cloud.

Kanban Tool

We are using the Kanban tool provided by GitHub.

Experiment Tracking Tool Approach

We will be using Weights & Biases to track our experiments throughout this data science project. This tool will allow us to log key metrics, visualize performance trends, and compare different model runs. This will facilitate efficient experimentation and analysis of our machine learning models. Weights & Biases is free to use for students.

References

[1] Zhang, Z., Luo, P., Loy, C. C., & Tang, X. (2015, September 14). Learning Social Relation Traits from Face Images. arXiv.org. <https://arxiv.org/abs/1509.03936>