

Tele-Emotion

Glenn Trace | Instructor: Christopher Asakiewicz

Introduction

One of the biggest weaknesses of telehealth appointments is the lack of physical tell of a patient walking into a room. In person, the doctor watches and understands how a patient carries themselves to assess how a person is feeling. This aspect was lost as appointments moved online. We believe our application will bridge the gap in effectiveness of in person vs virtual appointments by helping the doctor assess how a person is feeling in live video thanks to emotion facial recognition utilising advanced machine learning. Depending on the emotions our model brings back, OpenAI's API will provide resources to help.

Data and Scope

The data is provided by AffectNet, the world's largest annotated database of facial expressions, valence and arousal enabling research in automated facial expression recognition. We use over 400k images to train our model spanning 8 different emotions.

Citation: "AffectNet: A Database for Facial Expression, Valence, and Arousal Computing in the Wtld," in IEEE Transactions on Affective Computing, vol. 10, no. 1, pp.

18-31, 1 Jan.-March 2019, doi:

10.1109/afcc.2017.2740923.'

Methodology

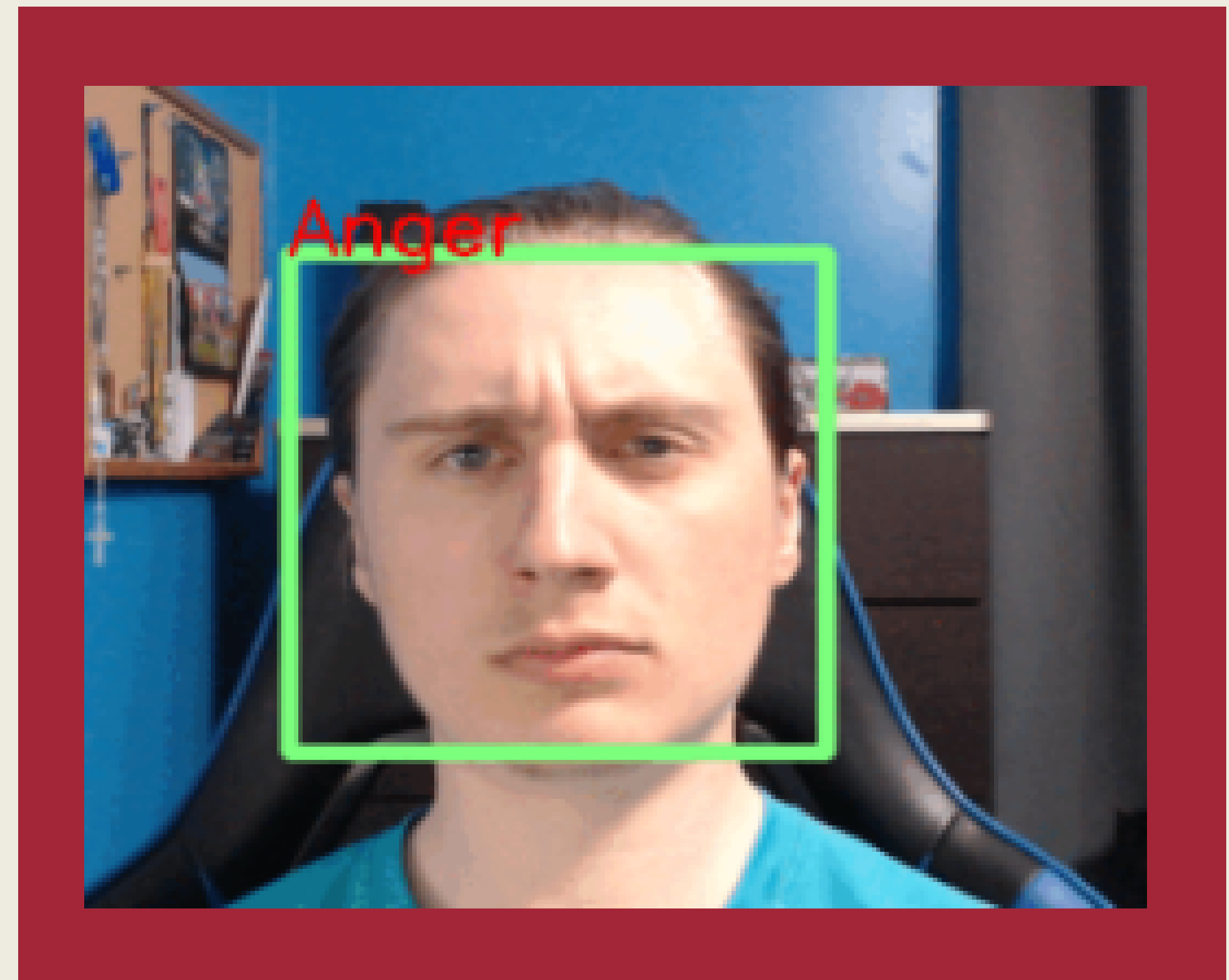
First, I built a convolution neural network with 4 convolutional layers, 1 flattening and 2 fully connected layers with softmax activation totaling over 4.4 million trainable parameters. After 50 epochs the model got to an impressive 75% accuracy. From there I saved our model architecture and model weights to be used in live video streams.

Next, we utilize CV2 which is a python library that allows live video frames to be chopped into a series of pictures that I can run the model off. Once the program is ran you are able to locate a person's face in the video-frame, draw a box around it, and finally display the emotion the model predicts the person is expressing.

Last, depending on the emotion and specific use case of the telehealth patient, I make API calls to OpenAI's API to bring back resources that will aid the patient and make the doctors life easier.

Tele-Emotion in Action

Example emotion recognition:



Example returned resources:

1. Mental Health America:
<https://www.mhanational.org/anger-management>
2. American Psychological Association:
<https://www.apa.org/topics/anger>
3. HelpGuide:
<https://www.helpguide.org/articles/emotional-health/anger-management.htm>

Conclusion / Future Scope

This project is a proof of concept that could be expanded upon to have practical use in the real world. If I had more time and resources I would focus on improving the CNN by adding more layers and utilizing cloud computing to more effectively train the model. I also focused on therapy in telehealth but this application could be expanded to be useful in other domains such as checkups, pediatrics, psychiatry, urgent care and more. I also could expand the application to collect more data on patient emotions and store it in a database for doctors at scale to draw insights from data analytics to improve the overall telehealth experience. Last, I could also create more logic on how to acquire resources for emotions detected. This means collecting emotions over the full duration of the call to find out patient's most prevalent emotions and send back resources accordingly.