Deep Learning Facial Recognition

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Abstract/Introduction

Facial Recognition in machine learning is a deep learning technique that can do a multitude of different things now. By training and testing a deep learning model we can teach it to recognize facial features and different people. This is extremely useful for many different reasons like security and research purposes. Training and testing a deep learning model to recognize faces first requires recognizing patterns and clustering those together to detect features. Finally those features are clustered together to find and detect faces.

In recent years deep learning and facial recognition has become much more advanced and has been useful for many different problems, such as, security, social media, preventing and solving crimes, diagnosing diseases and many other smaller uses that assist in everyday life. These models that are learning on their own will continue to get better and more complex

Methods

The data-set I used was from Kaggle.com. I used Python in Jupyter notebook to load, train and test my dataset of over 200,000 celebrity faces. After loading the data I used convolution to combine the image input matrix and the kernel matrix to form a feature mapped image. The output from the convolution layer is then sent to the activation function to bring in any non-linearity. The goal of this step is to remove all the negative values. The final step in convolution is pooling. In pooling I have my model detect features regardless of spatial positioning. During this step my model will also be down sampling the images by reducing the size of the image and removing all of the unimportant information. This step will help prevent my model from overfitting the data and also achieve spatial invariance.

The features that my model got from the feature learning steps is put into a flattening operation which gives it a single column of vectors. The flattened vector was then given as the input to the fully connected layer. When I completed the previous steps I trained a portion of my data so my model became more effective at recognizing patterns and forming facial features.

Results

After training my model through my dataset of celebrity faces it was able to recognize the pictures of celebrities and categorize who they are by the features of their faces. My model is able to show this by presenting images of celebrities with their correctly identified names.

If the model was given enough data of any given person, it would also be able to recognize and predict who that person was as well.

Discussion

This model, and all facial recognition models are being used more and more. Many of us use them every day to do something as simple as unlocking our phones. Some people are hesitant to trust facial recognition programs but in reality, it is much more secure than any password ever could be. Even some events have started using them to recognize VIP ticketholders by their face and allow them in without even having to stop at a window to check in. The application of special invariance can also help us determine images and faces that might otherwise be too difficult to recognize. With enough training and a proper dataset these features could be implemented into most facial recognition models.

References

https://scikit-learn.org/stable/auto_examples/applications/plot_face_recognition.html

https://www.kaggle.com/jessicali9530/celeba-dataset