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We worked on a facial recognition software that would take an image as an input and based on that image, it would determine that person's age, gender, ethnicity, and emotion. We also created a website to display our findings and how well the networks did. The goal of this project was to deepen our knowledge of neural networks and see, using neural networks, if artificial intelligence could determine all of these aspects based on an image of a person's face. It also allowed us to learn web development so that we could create the website to display results.

We created four neural networks for each aspect that we wanted to identify based on a person's face. This was done in Google Colab and we used Keras to build the neural network architecture and HTML, javascript, and CSS in order to create the website.

. We used UTKFaces off google and MMA Facial Expression on Kaggle, which provided us with a lot of images. However, because google colab would crash when we used a lot of data, we used about 12,000 images for most of our networks. All of it was categorical, and we used convolutional layers, pooling, dropout, and dense layers for our networks. Each aspect that we wanted to explore had varying results when run through the neural network. For example, the neural network that we built for gender was really good as it had an accuracy around 80-85% validation accuracy and the neural network for ethnicity was around 70% validation accuracy. However, the neural networks for age and emotion were significantly worse with sitting around 40% validation accuracy. We believe that the reason for the age and emotions were a bit lower in regards to accuracy could be due to either lack of data or the fact that there were a lot of

categories for each one that could have led to poor accuracy. We attempted to create the website but were unable to integrate the neural networks on python with the javascript and html. Instead, we ran our neural networks on a few pictures of us and our friends, and recorded the results of the predictions. It did pretty poorly in most aspects. It guessed that almost all of us were very old. It also got a few of our ethnicities wrong, and didn't guess gender right for every image. However, this may be because the images were not as focused on the faces and our neural networks were not trained on them.

What we concluded from this project is that using Keras, training a neural network is not very difficult at all and is very simple once you have done it for the first time. However, trying to increase the accuracy of the neural network is a lot more difficult and takes a lot more effort than actually creating training data for the neural network to run on. We also gained invaluable experience in using HTML, javascript, and CSS through this project and learning through the difficulties of the front-end aspect of it. This experience allowed for us as a group to increase our understanding of neural networks and AI and how powerful of a tool it can be when utilized to its full potential.