Teammate Names: Gerald Sebastian, Nathaniel Black

Classification of Two Hand Gestures

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7/15/22

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Dataset Used

HaGRID - HAnd Gesture Recognition Image Dataset from Kaggle

- Decided to make a classification model
  - Thumbs up or thumbs down
- 200 images in 2 classes
- 100 images in each
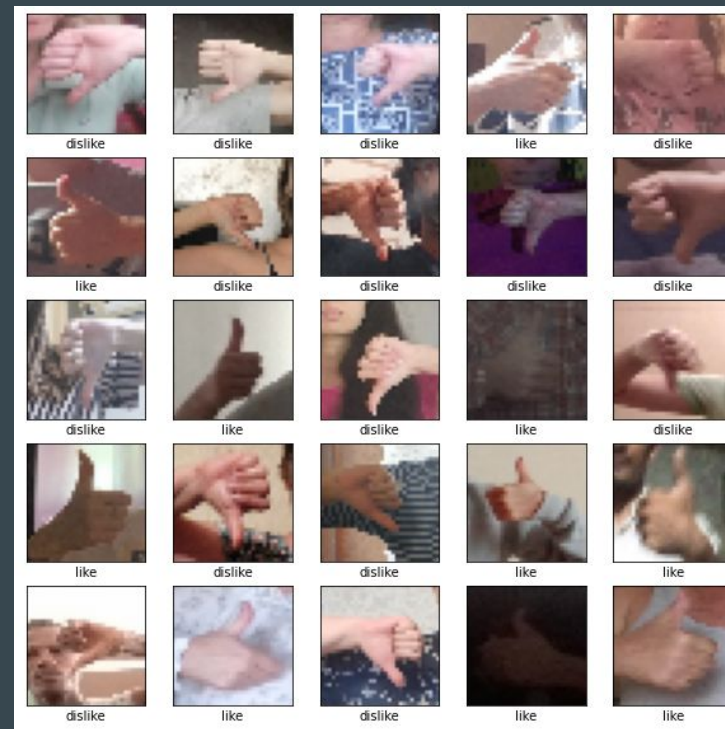- Split into 75 training images and 25 test images.

https://www.kaggle.com/datasets/kapitanov/hagrid?resource=download

Data Visualization
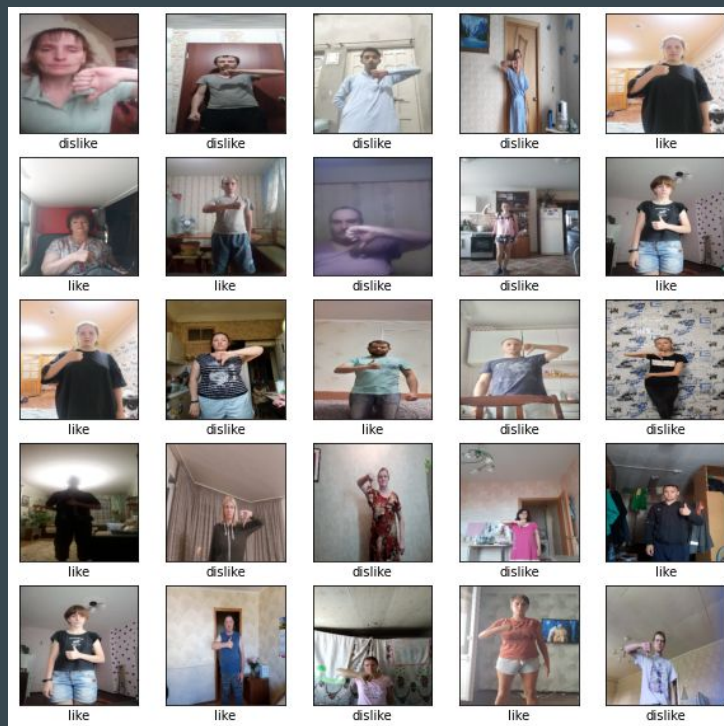
Original image (not cropped) 299x299

Cropped image 32x32

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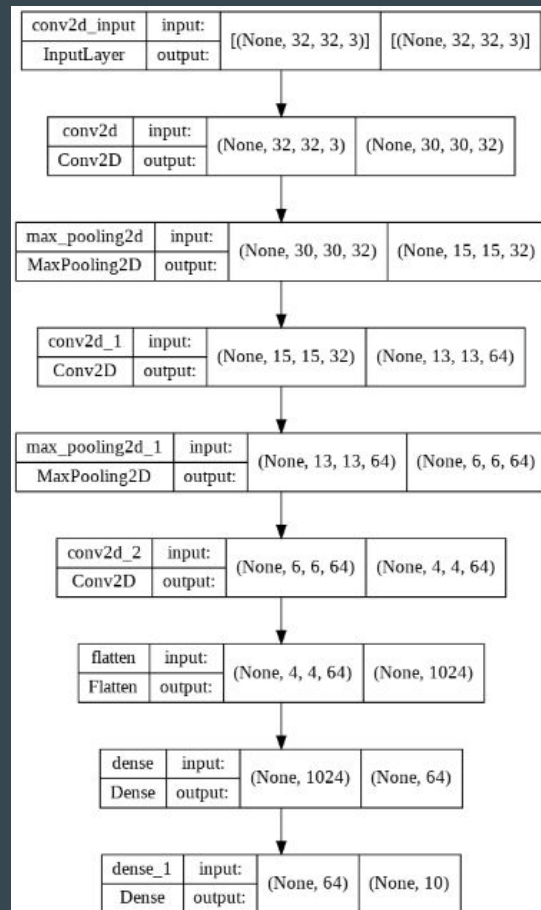
1st Model Construction

This project we used two different convolutional neural network models. The first model is the baseline model.
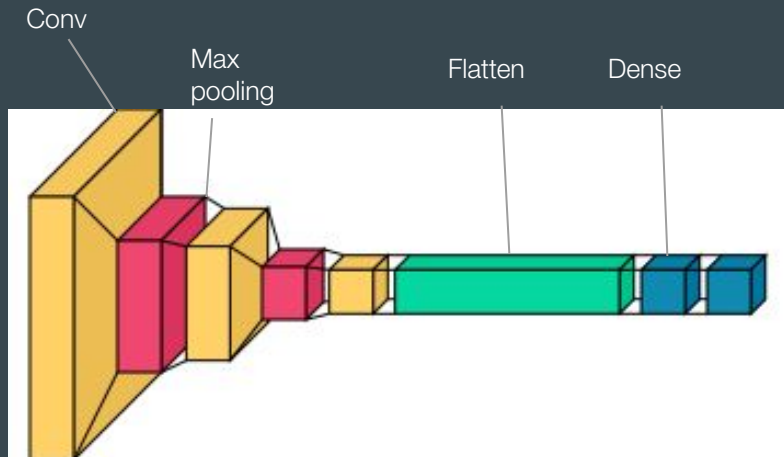
CNN Model illustrated using Visual Keras module

1st Model without Cropped Images

Original image
(not cropped)

- First used uncropped images
- Terrible results
  - Training accuracy: 1.0000
  - Validation accuracy: 0.4400
  - Test accuracy: 0.4400
- Overfitting past the first 2 epochs
- Even guessing would be ~0.5000
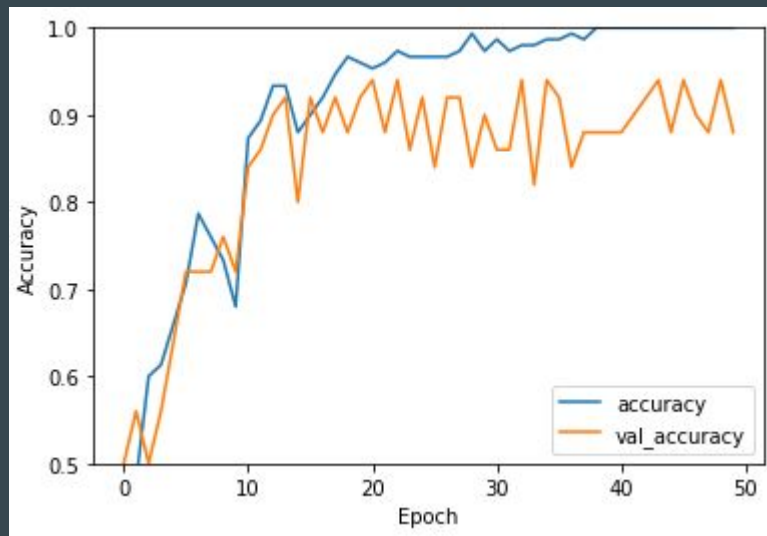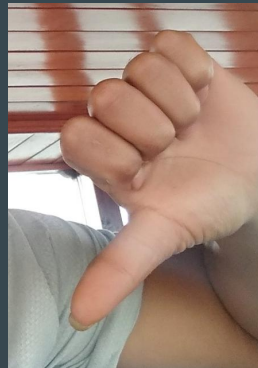- Explanation: most gestures were only a tiny portion of the image

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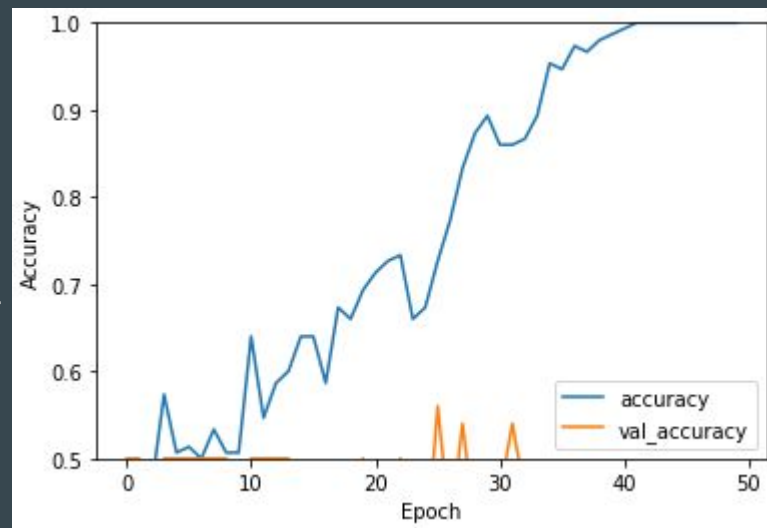
1st Model With Cropping Images
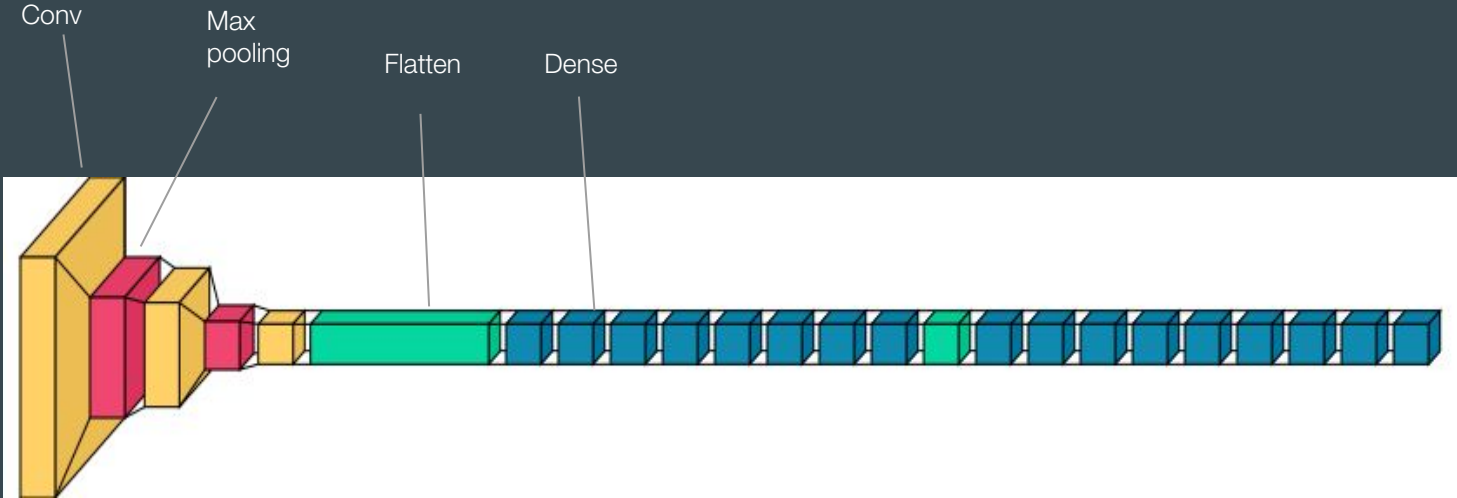
Cropped
Image

- Tried to automatically crop using .json file from dataset
- Decided to crop images manually
- Significant improvement
  - Training accuracy: 1.000
  - Validation accuracy: 0.8400
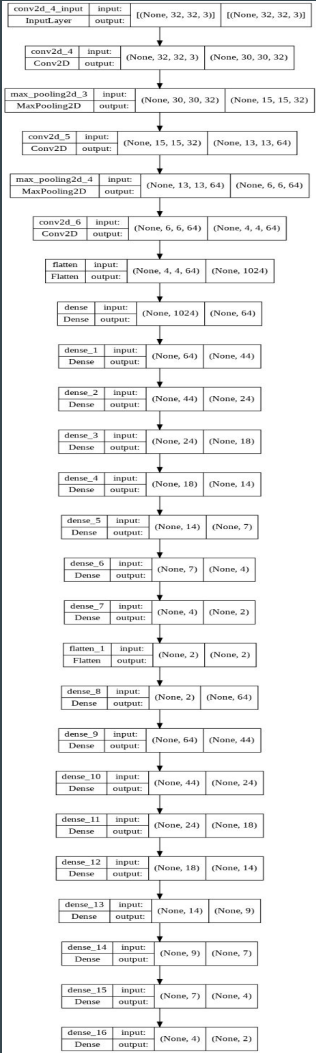 - Test accuracy: 0.8800
- Not that great for two classes

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2nd Model Construction


Conv

Max pooling

Flatten

Dense

CNN Model illustrated using Visual Keras module

2nd Model with Cropped Images

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- Excellent results
  - Added more dense layers and flattening layers
    - Makes it easier for the model to find the relationship between the data
    - Training accuracy: 1.0000
    - Validation accuracy: 0.9250
    - Test accuracy: 0.9799
  - Improvement
  - Decided to only run for 25 epoch
    - No changes in accuracy after ~25 epoch
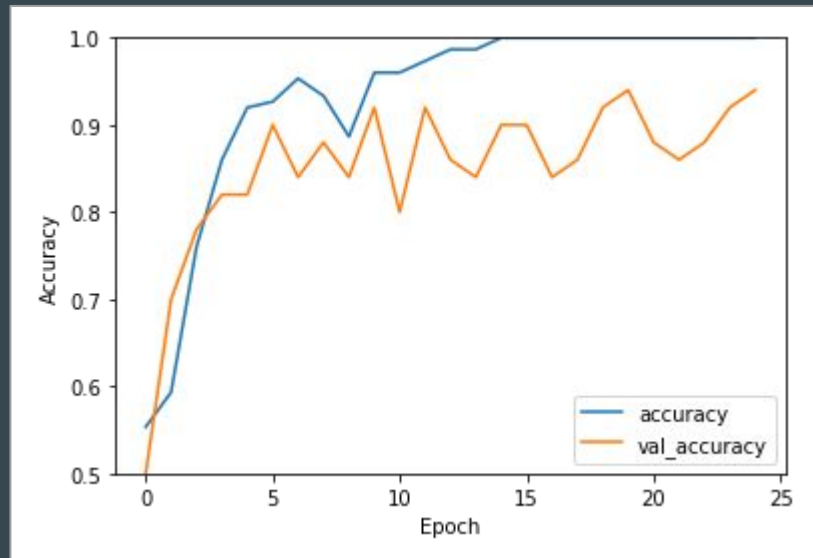
Conclusions

- The best model in our experiment performed 98% accuracy on the test set.
- This is 54% higher than the baseline model using uncropped images.
    - 10% higher than the 1st model using cropped images

What was learned:

- Python coding skills and implementation
    - Image classification using a CNN model
- Data/Image processing

What we could have done better:

- Figure out a function that would crop the images
    - Rather than manually cropping the images
    - Hand Gesture Recognition
- Create more models/tweak our existing models to yield more accurate results