

Give Me a Sign: Gesture Detection with Neural Networks

Brenner Heintz

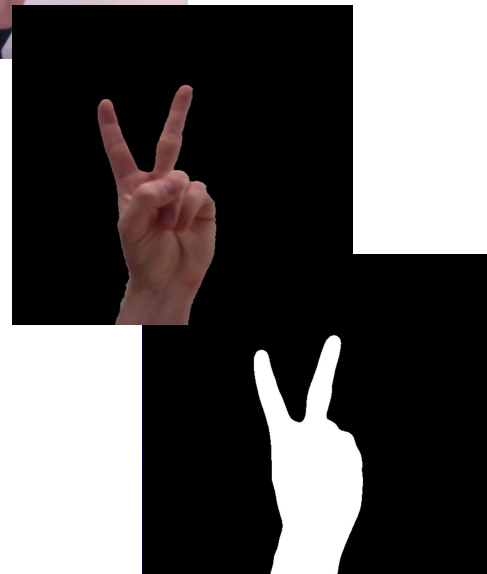


Goal: Build a neural network that
can reliably identify hand gestures
in real time



Building the Data

- Created a region of interest (ROI) box on webcam
- Take photo of background, create a background mask
- Use binary thresholding to isolate the hand
- 5 gestures, 550 images each



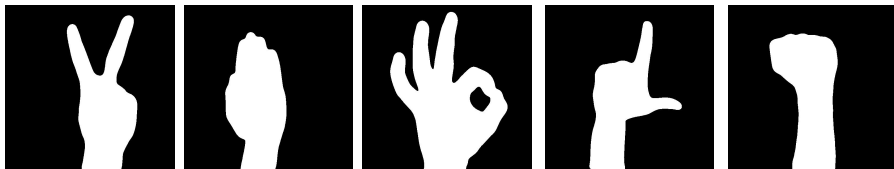
Peace

Palm

Okay

L

Fist



Process

Read

- Read files into NumPy arrays



- Convert to grayscale with Pillow



Build

- Built with Keras & TensorFlow



- Used VGG-16 with 4 dense layers on top

Train

- Trained in the cloud with AWS. Validated model with Kaggle data



Evaluate

- Build pipeline to decode predictions

- **Test with real time video on webcam**

- **F-1 Score: 98%**
- **Precision: 98%**
- **Recall: 98%**



Smart Home Application

- Connect to Philips Hue and Sonos APIs
- Created custom gesture bindings
 - Palm **turn music on, turn lights on**
 - Fist **turn music off, turn lights off**
 - Okay **turn music volume up**
 - L **turn music volume down**

SONOS



PHILIPS



Prediction: Palm (100.0%)
Action: Lights on, music on



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Thank You



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