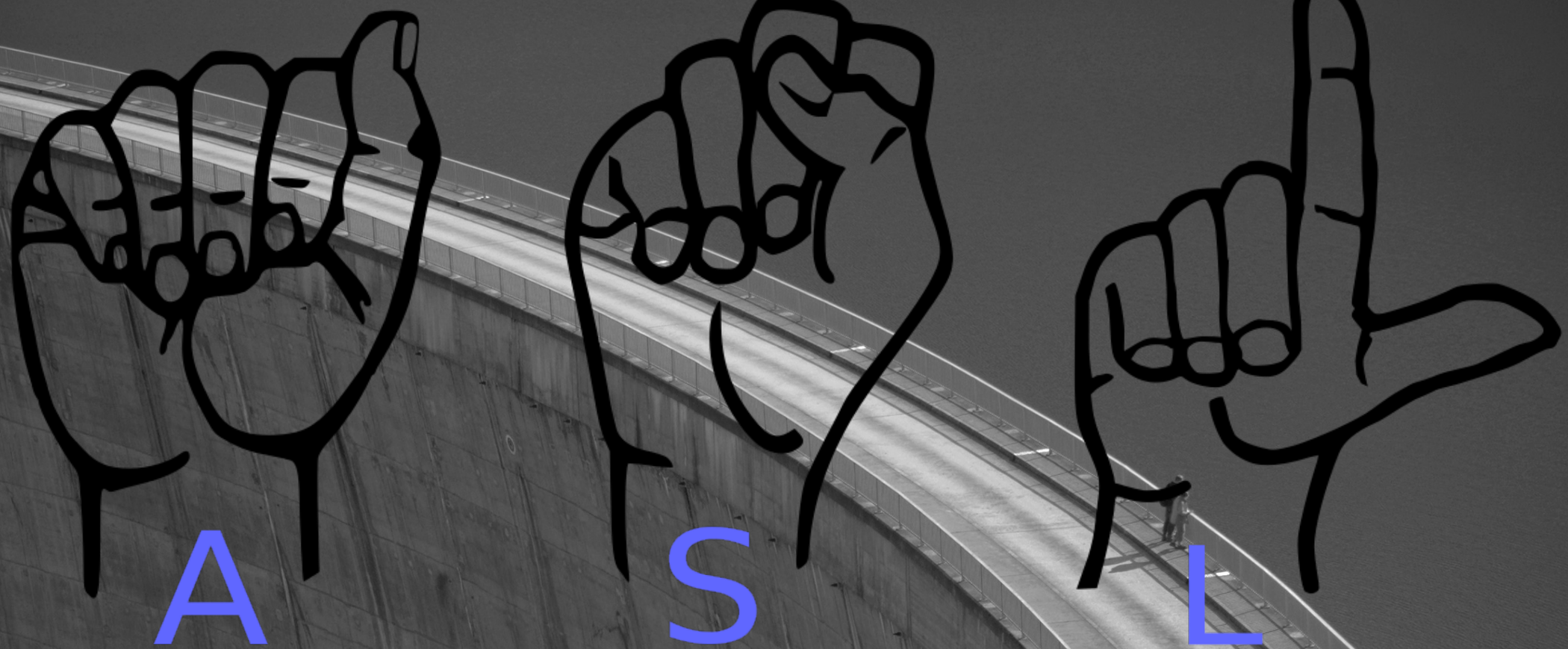
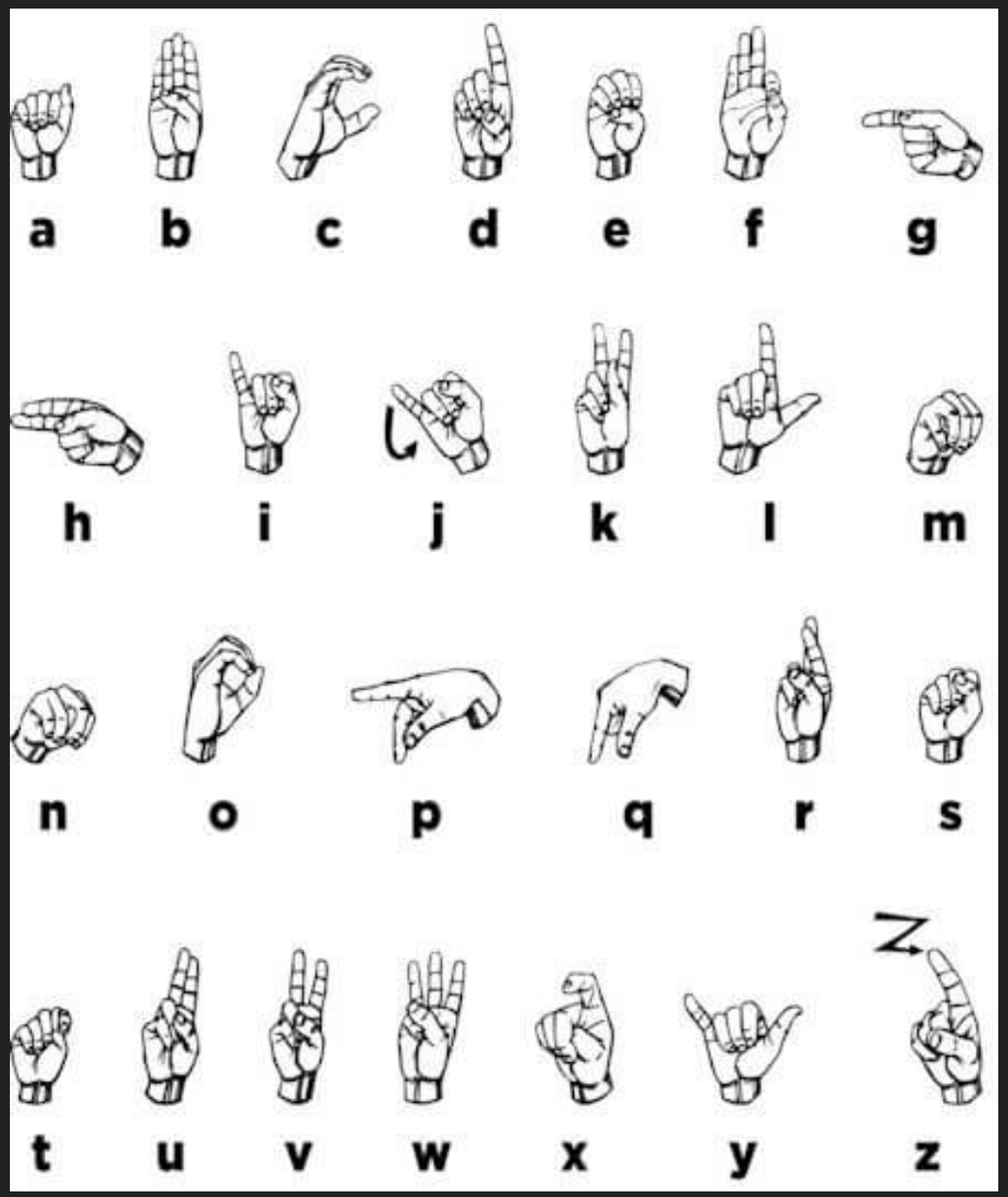


CHRISTOPHER LANGAN

AMERICAN SIGN LANGUAGE AND KERAS (CNN)



- CAN WE USE NEURAL NETWORK TO INTERPRET ASL ACCURATELY?
- CAN WE BRIDGE THE GAP BETWEEN THE DEAF/HOH AND HEARING INDIVIDUALS?
- IS THIS MODEL FOR THE ASL ALPHABET ENOUGH?

PROBLEM STATEMENT

DATA

- I used a data set that was available on kaggle.com that consist of 87,000 images of the letters A-Z in ASL
- 3000 for each letter, including ‘space’, ‘delete’, and ‘nothing’ for modeling purposes.
- If I had time, I would have created the images myself.

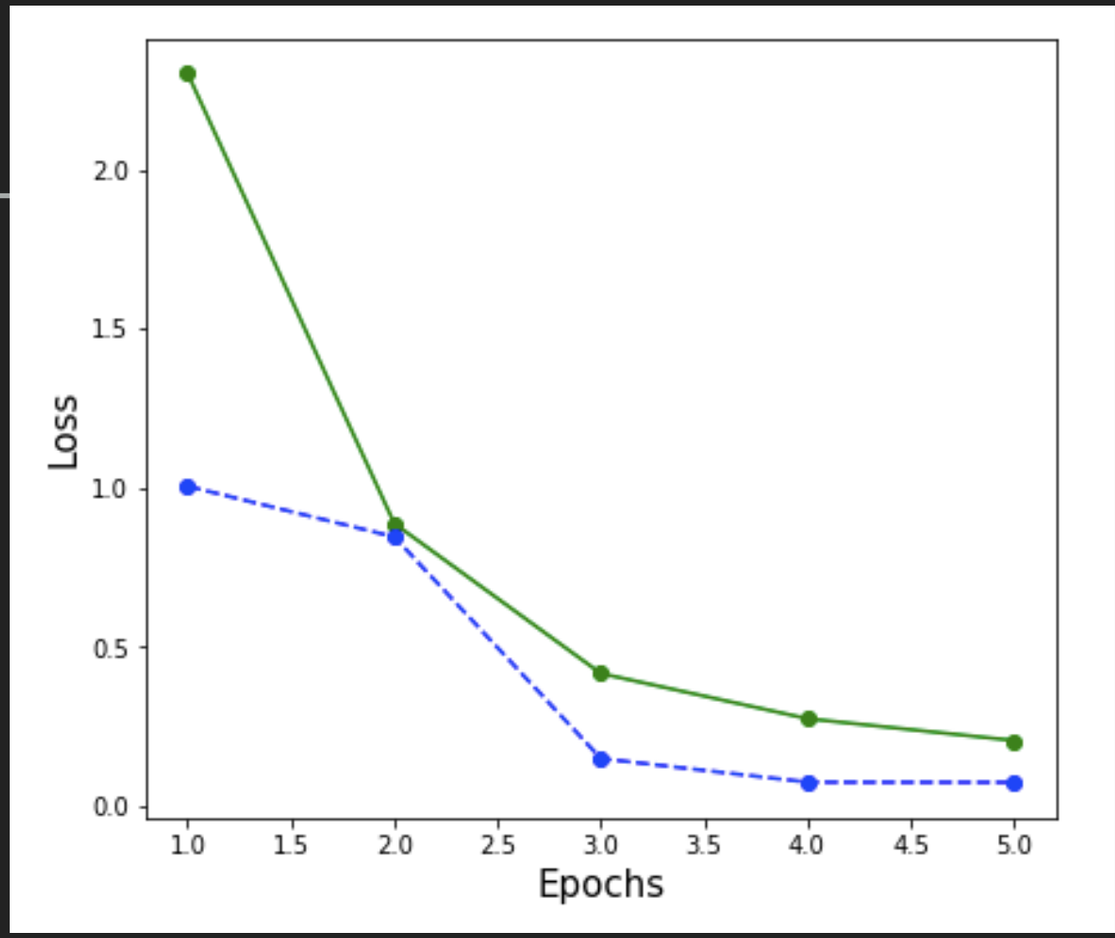

R
U
I
N
G
Z
T
S
A
F
O
H
del
nothing
space
M
J
C
D
V
Q
X
E
B
K
L
Y
P
W

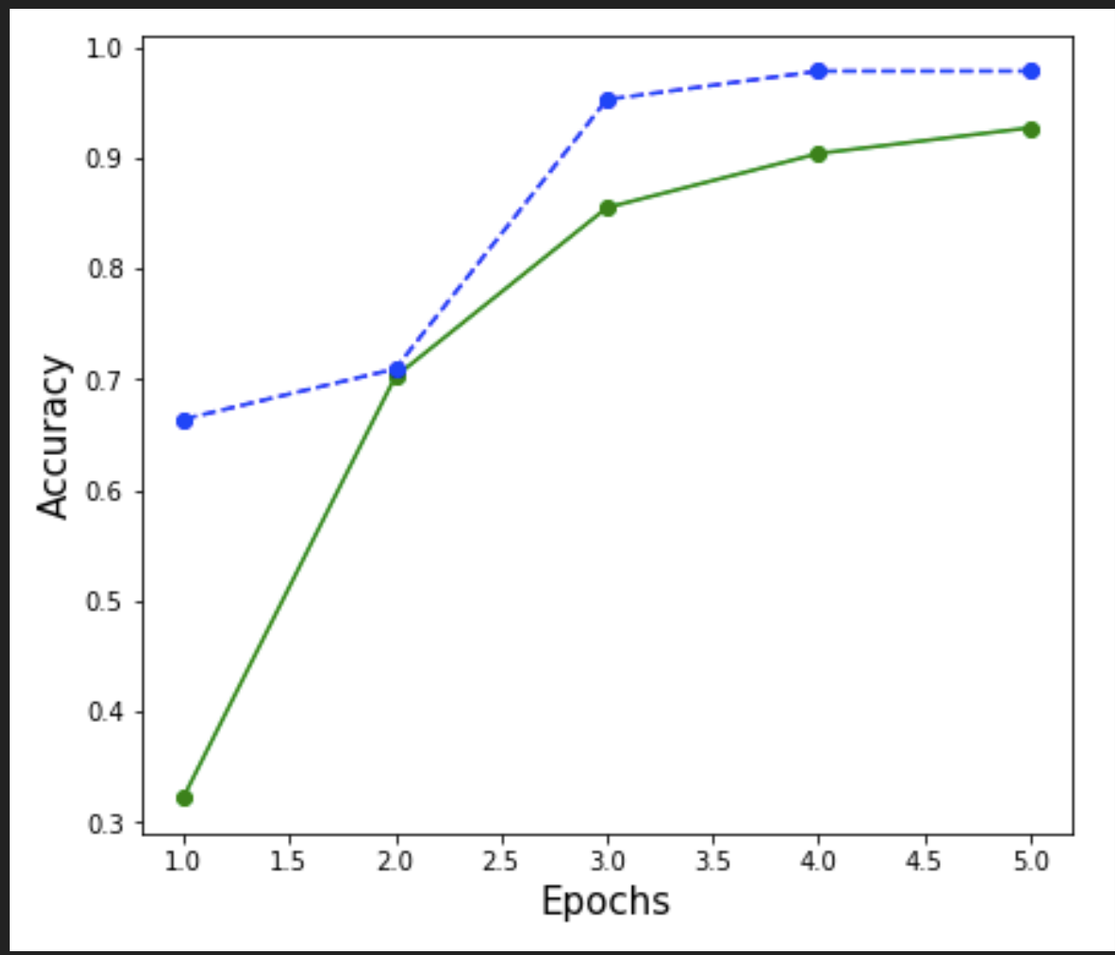
AMERICAN SIGN LANGUAGE

- American Sign Language is a visual language mainly used by deaf/hard of hearing individuals
- 1 million people use ASL as their primary language
- 70 million people around the world use sign language
- 98% of deaf people don’t receive education in sign language
- 72% of families do not sign to their deaf children

MODEL PERFORMANCE

- Train Accuracy: 92.73%
- Train Loss: 20.72%
- Train Validation Accuracy: 97.84%
- Train Validation Loss: 7.62%
- Test Accuracy: 98.05%
- Test Loss: 7.28%



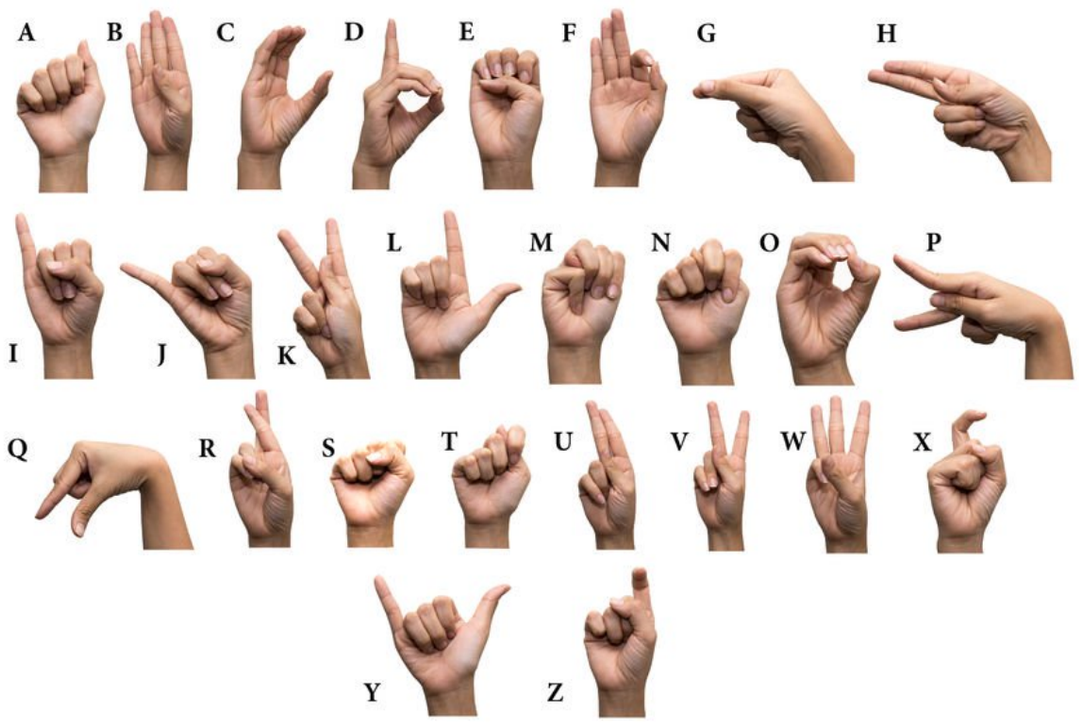


CONCLUSION

- This model was able to accurately predict the alphabet of ASL using Keras - Convolutional Neural Network

- We may simply bridge the gap between finger spelling using static photos

- Enough? No definitely not! With the many moving parts of ASL, a model for the alphabet is not enough for the language itself



WHAT IS NEXT?

- Include numbers into our data
- Add in a data set full of words from basic to extreme words
- Create a NLP model with the words data set. (1 sign could mean 5 different words, could be both a pos/neg thing)
- Make sure the parameters for that is able to accurately understand the context of the sentence

WHAT IS NEXT?

- I would also want to create a model that specifically focus on each of the 5 ASL parameters to be even more accurate. Such as:
- 1.) Handshape
- 2.) Movement
- 3.) Palm Orientation
- 4.) Location
- 5.) Non-Manual Markers (Facial Expression)
- The big goal is to be able to create an extremely accurate model to use as a backend for a phone app or some kind of camera that can provide real time American Sign Language closed captioning translation. Eventually reaching all sign language across the globe.

RESOURCES

- https://www.csd.org/about/statistics/
- https://prezi.com/p/xzv2bimw7_z3/sign-language-using-machine-learning-and-nlp/
- https://arxiv.org/pdf/1812.01053.pdf
- https://arxiv.org/pdf/1811.11436.pdf
- https://arxiv.org/pdf/1710.06836.pdf
- https://arxiv.org/pdf/1801.10111.pdf
- https://medium.freecodecamp.org/weekend-projects-sign-language-and-static-gesture-recognition-using-scikit-learn-60813d600e79
- https://www.kaggle.com/dsilvadeepal/asl-alphabet-classification-with-cnn-keras
- https://www.google.com/search?q=asl&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj5uLyK16LiAhVidt8KHXTpCmsQ_AUIDigB&biw=1340&bih=633#imgrc=7HOKSEvnsXedqM:
- https://www.google.com/search?q=asl&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj5uLyK16LiAhVidt8KHXTpCmsQ_AUIDigB&biw=1340&bih=633#imgrc=wh9yU9fEYvMEeM:
- https://www.google.com/search?q=asl&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj5uLyK16LiAhVidt8KHXTpCmsQ_AUIDigB&biw=1340&bih=633#imgrc=Di7oocE8EZ03LM: