ML-Based ASL Alphabet Recognition

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Project goal

We Wanted to Create an ML-based Live ASL Recognition System

Why ASL? Background

- ~48 million Americans (15% of total population) have some degree of hearing loss
- Artificial Intelligence is increasingly becoming ubiquitous in all aspects of life
- Increase A.I. algorithm inclusiveness by having A.I. systems reflect the needs of the disabled
    - promote algorithms for people with disabilities, in particular people with hearing disabilities
- Our ML model
    - assist people with hearing loss
    - providing automated framework that transcribes ASL into written language
        - by recognizing alphabet letters from ASL hand signals

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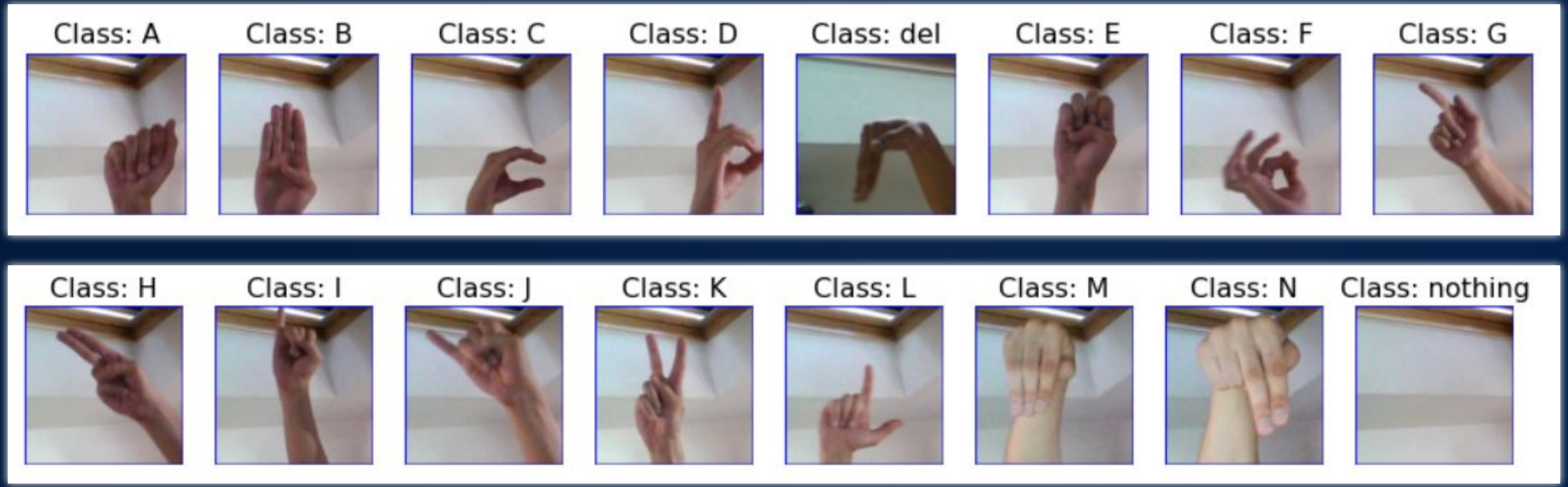
Behind the Scenes

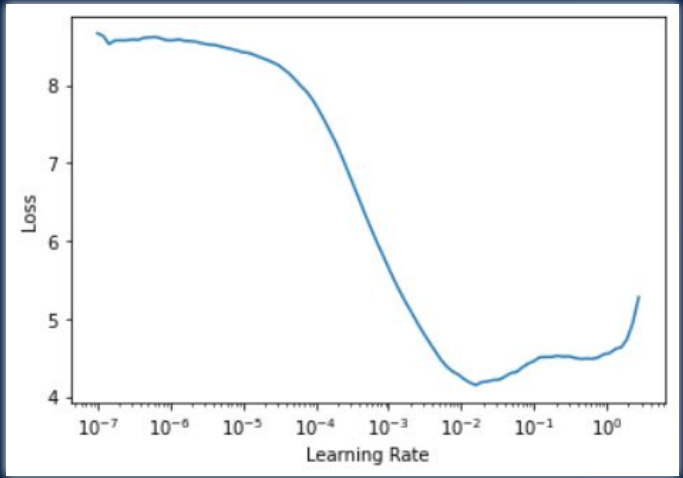
Dataset Overview

- The dataset consists of 87,000 images of American sign language
- 70% of the images are used for training and 30% for testing



The Process

- We used a pretrained ResNet 50 model for training
- We then used the learn.lr_find function from the FastAI library to find the best learning rate
- Our final model achieves an accuracy rate of almost 100%



epoch	train_loss	valid_loss	error_rate	accuracy	time
0	0.077404	0.171081	0.046284	0.953716	2:39:22
1	0.001674	0.000877	0.000229	0.999771	13:49
2	0.000082	0.000242	0.000115	0.999885	13:49

Real-Time Prediction System

- OpenCV - a Python library aimed at real-time computer vision tasks
- Handles tasks including face recognition, object detection, etc.

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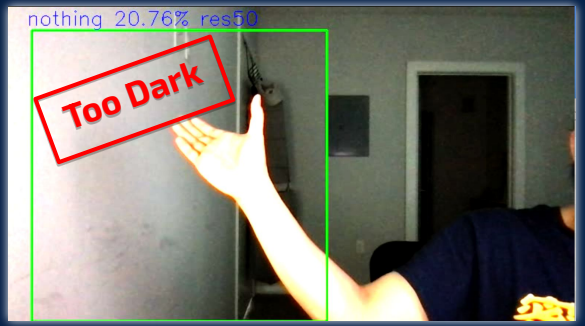
Output

Demonstration

INSERT DEMO CLIPS HERE

Model Shortcomings

- Distance
- Lighting



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Future Steps

How Can We Make It Better?

Utilize a Larger Training Set

Create a more diverse training image set, allowing for more accurate outputs (mirrored images for left-handed people)

Evolving the Model to Recognize Words

Recognize words and their associated sentiments, allowing us to blend both the ideas of CNN and NLP into the project.

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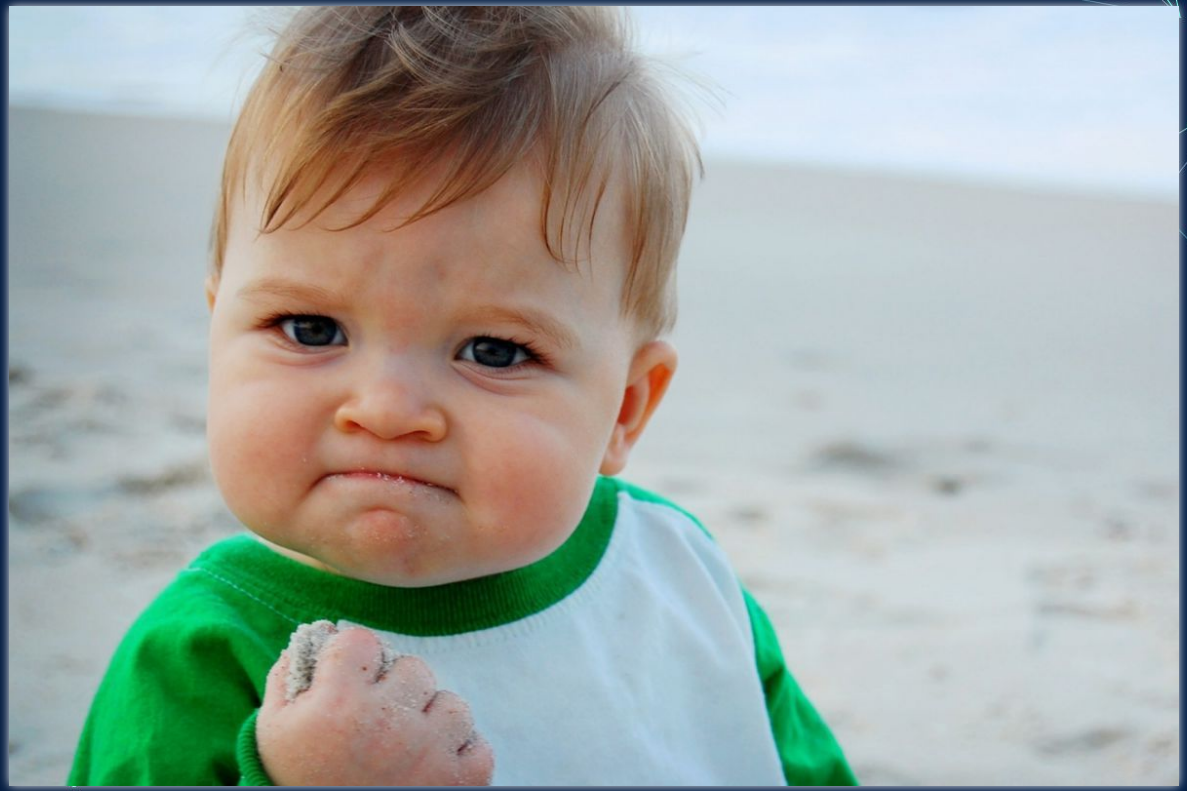
Conclusion



Recap

01 Goal

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THANKS!