PHASE 1: PROJECT PROPOSAL

Team 13, 19

Project Team 8

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HAND GESTURE RECOGNITION

Problem

People with hearing disabilities often need to rely on another person to learn and communicate in sign language. We believe it would be easier and more fulfilling for people with disabilities to learn independently with the use of AI. This problem pertains to education, healthcare and technological fields. Most technologies are not tailored towards people who cannot use the standard UI. With a variety of AI technologies emerging, we believe it will increasingly become a challenge for disabled people to keep up.

Solution

A combination of different hand gesture AI models along with sign language driven applications can contribute significantly to the problem. Our solution, the Hand Gesture recognition software, will be a self teaching sign language application. The software will be able to detect the hand motions/gestures and output the message and/or symbol. Our model will be trained to recognize the motions with reliable confidence and accuracy.

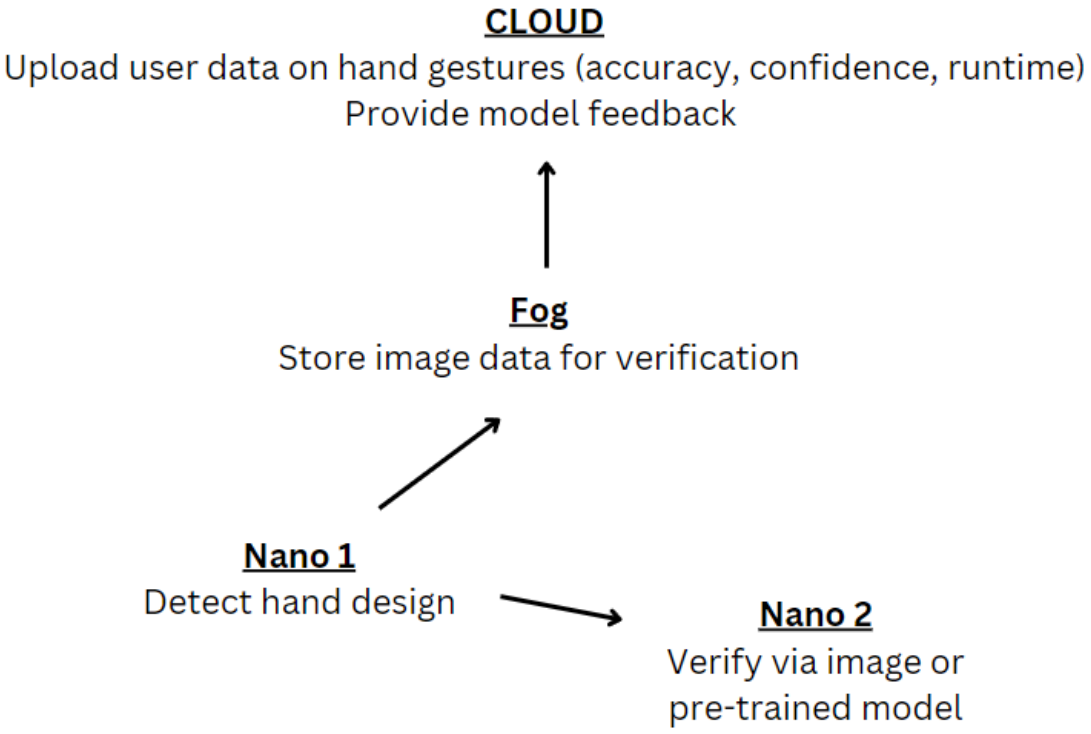
The general solution can be applied to other industries like robotics where commands can be inputted by the user with hand signs for faster and more efficient performance. Many drones and robots are trained nowadays using hand gestures instead of hard coded commands. Particularly, for personal devices, it would be important to have signed commands like opening an app or searching the internet by using the camera for a hand sign recognition. This is beyond the scope of our solution and implementation however our solution could be integrated into larger projects towards building such models.

Demo

Our model will have access to large image data that it will use to verify the shown sign. Since hand motions are harder to detect within frames, we will need to pre-train our model extensively with different hand shapes and sizes for better accuracy and consistency of results. We plan on extending the existing implementation of the following projects to set up the initial model (https://developer.nvidia.com/embedded/community/jetson-projects/robot_nano_hand , https://developer.nvidia.com/embedded/community/jetson-projects/rock_paper_scissors). We will include additional gestures for our solution and add in a cloud storage service for the user. Our edge devices will scan and detect the hand gestures and display the message. The backend

will mostly depend on our fog layer (personal workstation) which will have the larger image data to verify the signs. The jetson nanos (4gb and 2gb) will use a camera to scan and match the sign with an image respectively. Tools and skills learned in lab 2 will also be applied.

Task Distribution



GitHub Repository

https://github.com/rfairooz/CS131_Project

Powerpoint Presentation

CS131_Project