Sign Language

Abstract:

There were various technological improvements, as well as much research, to assist the deaf and dumb. Deep learning and computer vision can also be utilized to help with the cause. This can be extremely useful for deaf and dumb people in interacting with others, as understanding sign language is not something that everyone has. Furthermore, this can be extended to building automatic editors, where a person can easily write using only their hand movements.

Dataset:

Data Collection:

There are a lot of words in sign language, although some of them are depicted in the same way as others, the intensity of the gestures varies. In order not to confuse the model with such things, and to keep it simple, 30 words related with the weather were chosen. Each word, was performed 30 times, and each video consisted of 30 frames. In conclusion, 30x 30(videos each image) x 30(frames each video), for a total of 27000 data points, stored and saved as NumPy arrays.

Algorithms:

We needed a Neural Network model to feed and train our dataset in the next phase of our project. A Long-Short-Term-Memory model was used for this challenge. The LSTM is a type of artificial recurrent neural network architecture used in deep learning. Unlike traditional feed-forward neural networks, LSTM incorporates feedback connections, making it an ideal contender for time series issues with uncertain lags between significant events, such as ours. The training data was supplied into the LSTM after a simple split of the data into training and testing. Between categorical cross-entropy and others, the Kullback Leibler Divergence proven to be the most accurate loss function. After 555 epochs, the train was finished.

Tools:

Python • Jupyter • NumPy • cv2 (OpenCV) • Keras • Tensorflow