**Image processing** is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. Here input is an image but output maybe image or some information associated with that image.

Hand Gesture Recognition is based on concept of Image processing. Hand gestures are a form of nonverbal communication that can be used in several fields such as communication between deaf-mute people, robot control, human–computer interaction (HCI), home automation and medical applications.There are many applications where hand gesture can be used for interaction with systems like, videogames, controlling UAV’s, medical equipment’s, etc. It is a technology that is becoming increasingly relevant These hand gestures can also be used by handicapped people to interact with the systems. General interactions tools like keyboard,mouse etc. limit the way we use the system. All these systems require physical contact, in order to interact with system whereas gestures can interpret same functionality without physical interaction. The problem here is, as for different people, the same gesture may look different for performing the same task. This problem may be overthrown by the use of Machine Learning approaches.

**Description of the Sign-Language MNIST Problem (American Sign Language):**

American Sign Language (ASL) is a complete, natural language that has the same linguistic properties as spoken languages, with grammar that differs from English. ASL is expressed by movements of the hands and face. It is the primary language of many North Americans who are deaf and hard of hearing, and is used by many hearing people as well. The dataset format is patterned to match closely with the classic MNIST. Each training and test case represents a label (0-25) as a one-to-one map for each alphabetic letter A-Z (and no cases for 9=J or 25=Z because of gesture motions). The training data (27,455 cases) and test data (7172 cases) are approximately half the size of the standard MNIST but otherwise similar with a header row of label, pixel1,pixel2….pixel784 which represent a single 28x28 pixel image with grayscale values between 0-255. The original hand gesture image data represented multiple users repeating the gesture against different backgrounds.

**Problems Explaination**

We are given all the different gasture images considered in ASL (Americal Sign Language) and we need to come up with a machine learning model wich can classifiy the images correctly ,or can tell us the class to which the given image belongs. Basically we will be building a image classification model .

Modified [National Institute of Standards and Technology](https://en.wikipedia.org/wiki/National_Institute_of_Standards_and_Technology) database

**Disadvantages of decision trees:** They are unstable, meaning that a small change in the data can lead to a large change in the structure of the optimal decision tree.

The main limitation of **random forest** is that a large number of trees can make the algorithm too slow and ineffective for real-time predictions. In general, these algorithms are fast to train, but quite slow to create predictions once they are trained.

**Macro average gives each prediction similar weight while calculating loss** but there might be case when your data might be imbalanced and you want to give importance to some prediction more (based on their proportion), there you use 'weighted' average.