

# THE BECKON NETWORK

MINOR PROJECT SYNOPSIS

**BACHELOR OF TECHNOLOGY**

Information Technology

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# 1 Introduction

This project aims at identifying alphabets in Indian Sign Language from the corresponding gestures. Sign languages aren't easy to learn and are even harder to teach. They use not just hand gestures but also mouthings, facial expressions and body posture to communicate meaning. This complexity means professional teaching programmes are still rare and often expensive. But this could all change soon, with a little help from artificial intelligence (AI) and machine learning (ML). Therefore, to build a system that can recognise sign language will help deaf and hard-of-hearing better communicate using modern-day technologies.

Gesture recognition and sign language recognition has been a well researched topic for American Sign Language(ASL), but few research works have been published regarding Indian Sign Language(ISL). We aim to solve this problem using state of the art computer vision and machine learning algorithms.

## 2 Objectives

1. To identify alphabets in Indian Sign Language from the corresponding gesture.
2. To recognise from images(which can be obtained from say webcam) and then use computer vision techniques and machine learning techniques for extracting relevant features and subsequent classification.
3. To take the basic step in bridging the communication gap between normal people and deaf and dumb people using Indian sign language.
4. To design a solution that is intuitive, simple and user friendly.

### 3 Feasibility Study

Operational Study: This project will work using the ML technique CNN (Convolutional Neural Network). The CNN works just like human brain. It takes various inputs, does some computations and gives some output. Using CNN would result into greater accurate results. It is made up by a large network of learning units called Perceptrons. The units learn how to convert input, e.g. picture of a hand gesture, into the respective desired output, e.g. the label of gesture recognized, forming the basis of automated recognition.

A screen would show up and the user will make some sign with his/her hands and our system would determine the shown sign in English language.

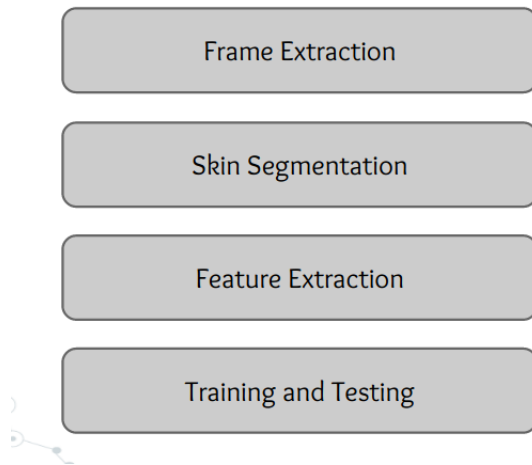
Technical Study: A detailed study of CNN reveals that our system would be first taught by a training data wherein our own hand sign inputs and outputs would be given. Then, the system would itself analyze the redundant patterns in the inputs provided, which would help it to classify when new images will be fed.

Our very first step would be image capturing in real time. The next step will be hand detection followed by cropping hands, processing steps will be executed and the features will be determined from the images by segmentation based on colour. After features are obtained, the gestures will be recognised and converted to text followed by sentence formation. At last, the output will be displayed.

Economical Study: Since our project donot needs any kind of financial aid, it is economical. Moreover, if more features were to be added, it would be easy as we are using Python language. Also this would be very useful for interacting and connecting with people.

## 4 Methodology/ *Planning of work*

A Neural Network is a machine learning framework which is based around the human brain, thereby creating an Artificial Neural Network using algorithms enabling the computer to learn by incorporating new data. It is made up by a large network of learning units called Perceptrons. The units learn how to convert input, e.g. picture of a hand gesture, into the respective desired output, e.g. the label of gesture recognized, forming the basis of automated recognition. The computer is taught by having it examine training data, which were labelled initially. A usual task for a neural network is object recognition, where it is fed a large collection of images belonging to a certain class, such as a hand sign and the computer analyzes the redundant patterns in the images fed to it, which helps it to classify when new images are fed.



The first step is image acquisition which is primarily concerned with image capturing in real time. The next step is hand detection followed by cropping hands, preprocessing steps are executed and the features are determined from the images by segmentation based on colour. After the features are obtained the gestures are recognized and converted to text followed by sentence formation. Finally, the text is taken as an input and translated to a gesture.

## 5 Facilities required for proposed work

We require knowledge about ML and CNN, Tensorflow and Python. Moreover, we also need to study storing the input of our training data. Requirement for a computer/laptop with a good internet connection and camera is also required.

## 6 References

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- [3] <https://towardsdatascience.com/american-sign-language-recognition-using-cnn-36910b86d651>