

## DESIGN LAB REPORT

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# Handwritten Character Recognition

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## Chapter 1

# Introduction

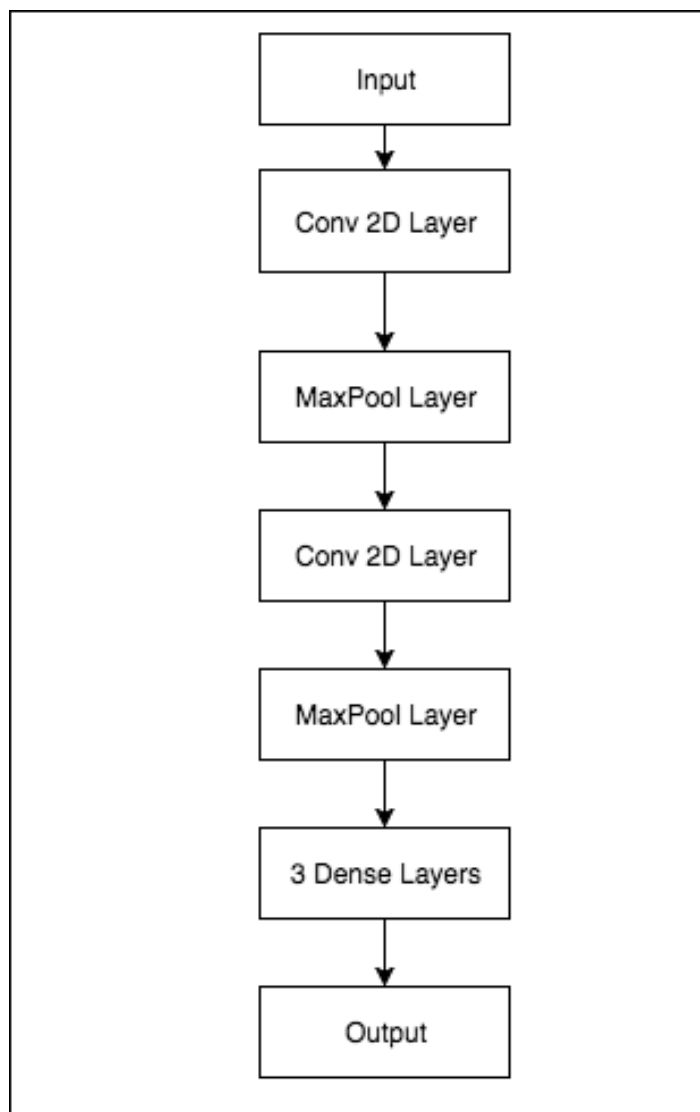
This project is a software algorithm project to recognize any hand written character efficiently on computer with input is an optical image. Character recognition, usually abbreviated to optical character recognition or shortened OCR, is the mechanical or electronic translation of images of handwritten, typewritten or printed text (usually captured by a scanner) into machine-editable text. It is a field of research in pattern recognition, artificial intelligence and machine vision. Though academic research in the field continues, the focus on character recognition has shifted to implementation of proven techniques. Optical character recognition is a scheme which enables a computer to learn, understand, improvise and interpret the written or printed character in their own language, but present correspondingly as specified by the user. Optical Character Recognition uses the image processing technique to identify any character computer/typewriter printed or hand written. A lot of work has been done in this field. But a continuous improvisation of OCR techniques is being done based on the fact that algorithm must have higher accuracy of recognition, higher persistency in number of times of correct prediction and increased execution time. The idea is to device efficient algorithms which get input in digital image format. After that it processes the image for better comparison. Then after the processed image is compared with already available set of font images. The last step gives a prediction of the character in percentage accuracy.

This project is a part of a bigger project. We have to recognize the prescriptions given by doctors. The task has been divided into preprocessing, character recognition and correction of predicted words. For character recognition, we have used Convolution Neural Network.

## Chapter 2

# Model

Our model has 2 convolution layers and 3 densely connected layers connected as shown in the figure. The first convolution layer uses a kernel of size 5X5 and has 30 filters and the second one uses kernel of size 3X3 and has 15 filters. We have used relu activation function. We have maxpooling layers with pool size of 2X2 after each convolution layer.



We trained on NIST Special Database 19 that contains NIST's entire corpus of training materials for handprinted document and character recognition. It publishes Handprinted Sample Forms from 3600 writers, 810,000 character images isolated from their forms, ground truth classifications for those images, reference forms for further data collection, and software utilities for image management and handling. The dataset has 62 classes, 26 capital letters, 26 small letters and 10 digits. We have divided the dataset in a ratio of 4:1 for training and validation.

We have achieved an accuracy of 87% on this dataset. We will be working on improving the accuracy of text detection by predicting the words by looking at the semantics.