

Gujarati Word Recognition Using CNN

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Abstract- In this paper, we describe various techniques of character recognition for Gujarati text detection. We usually use OCR for character recognition. For development of Gujarati text detection tool we use review of this paper. Recognition and its types can be describe with the help of basics. Special property of the text can be taken in consideration while recognition process going on

Keywords- Fetchers wrenching techniques, offline text detection online text detection, handwritten word detection, printed word detection

I. INTRODUCTION

Character recognition is widely studied pattern recognition and its problem. In offline character recognition we need to follow certain steps firstly we take scanned image of relatable document this image should be in colour form. In recognition process this image transfers into gray scale so that image consist in form of zero and one. Offline text recognition can be done in two ways

- 1].Handwritten
- 2].Printed

1. Gujrati Script

Gujrati language is an Indo -Aryan Language which having complex structure. Gujarati script is derived during 16th century from Devanagari script and it is modern language of India. Main difference between Gujarati and Devanagari script is the lack of horizontal line at header of character in Gujarati script and small modification in the characters. Until The 19th century Gujarati script was only used for accounting and writing letters, because of this Gujarati script was also known as Banker’s, Merchant’s and traders script.

Vowels (સવર્ગ)						
અ	આ	ઇ	ઈ	ઉ	ઊ	ઋ
a	ā	i	ī	u	ū	r̥
વ	વા	વિ	વી	વુ	વૂ	વૃ
va	vā	vi	vī	vu	vū	v̥
એ	ઐ	ઔ	ઋ	ૠ	ઋઃ	
e	ai	au	ā	āḥ	āḥ	
વે	વૈ	વૌ	વૃ	વૃઃ	વૃઃ	
ve	vai	vau	v̥	v̥ḥ	v̥ḥ	

Figure 1. Consonants of Gujarati Script

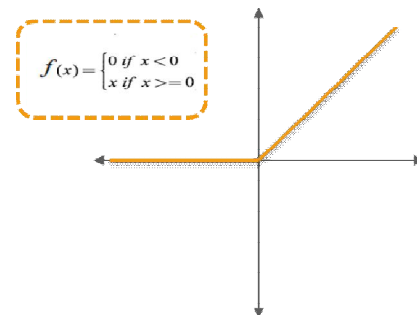
Consonants (સવર્ગ)									
ક	ખ	ગ	ઘ	ચ	જ	ઝ	ટ	ઠ	ડ
ka	kha	ga	gha	ca	ja	zha	ṭa	ṭha	ḍa
સ	ઙ	ણ	ત	થ	દ	ધ	ન	પ	ભ
sa	ṅ	ṇ	ta	tha	da	dha	na	pa	bha
બ	ભ	મ	ય	ર	લ	લ	શ	ષ	સ
ba	bha	ma	ya	ra	la	va	śa	ṣa	sa
હ	ળ	ક્ષ	ગ્ન						
ha	ḷ	kṣa	gna						

Figure 2. Vowels of Gujarati Script

2.Convolution Neural Network

Convolutional Neural Networks, like neural networks, are made up of with neurons learnable weights and biases. Each neuron receives several inputs, takes a weighted sum over them, pass it through an activation function and responds with an output. Neural networks, as its name suggests, is a machine learning technique which is modelled after the brain structure. It comprises of a network of learning units called neurons.

These neurons learn how to convert input signals into corresponding output signals, forming the basis of automated recognition.



2.1 Convolution Of An Image

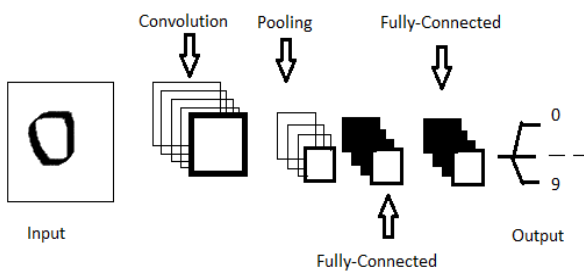
Convolution has the nice property of being translational invariant. Intuitively, this means that each convolution filter represents a feature of interest (e.g. pixels in letters) and the Convolutional Neural Network algorithm learns which features comprise the resulting reference (i.e. alphabet).

- **Line up** the feature and the image
- **Multiply** each image pixel by corresponding feature pixel

- **Add** the values and find the sum
- **Divide** the sum by the total number of pixels in the feature

2.2 Rectified Linear Unit (ReLU) transform function only activates a node if the input is above a certain quantity, while the input is below zero, the output is zero, but when the input rises above a certain threshold, it has a linear relationship with the dependent variable.

Consider the below example:



2.3 Pooling Layer

In this layer we shrink the image stack into a smaller size. Pooling is done after passing through the activation layer. We do this by implementing the following 4

steps:

- Pick a window size (usually 2 or 3)
- Pick a stride (usually 2)
- Walk your window across your filtered images
- From each window, take the maximum value

2.4 Fully Connected Layer

Lastly after several convolutional and max pooling layers, the high-level reasoning in the neural network is done via fully connected layers. Neurons in a fully connected layer have connections to all activations in the previous layer, as seen in regular (non-convolutional) . Their activations can thus be computed as an , with a bias offset.

2. Techniques used for scripts

In paper presented Zone identification technique. Zone identification technique identifies three zones from Gujarati characters i.e. Base character zone, Upper modifier zone and Lower Modifier zone and Lower zone. They have

found that several characters are discriminated by specific modifier, which exist in upper and lower zone. Therefore they have used Zone identification technique. Thinning & skew correction is used for pre-processing and use Multi Layered Feed Forward Network for classifying digits.

3. Dataset

There is no standard dataset available for handwritten characters. Researcher has to develop own character dataset collected from minimum 10- 15 people. For better result and accuracy collect dataset from large number of people, as different people has different writing styles, it will include variation in the character which will be useful.

4.Accuracy Table

Dataset	Accuracy
Text Dataset	97.5
Digit Dataset	97.5

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