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# ASSIGNMENT 3

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## Group no 57 - Akatsuki

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### 1 Question 1

#### 1) Preprocessing :

- 1) Background Removal
- 2) **Erosion** filter on this
  - i) kernel= 5x5 size
  - ii) iterations = 2
- 3) **Dilation** filter on eroded image
  - i) kernel= 5x5 size
  - ii) iterations = 2
- 4) Converted **RGB** image to **Grayscale** image
- 5) Segmented 3 characters from image by cropping image each of size **150x166** pixels
- 6) Converted string labels to integer by **labelEncoder** of **sklearn** class and then created one-hot encoding of each label
- 7) Reshaped vectors such that they satisfy our model's dimensions.

#### 2) Model:

Took reference from paper published by IIT Kanpur students :  
[<https://www.cse.iitk.ac.in/users/stushar/assets/pdf/decaptcha.pdf>] 'DeCAPTCHA by Mriganka Shekher Chakravarty, Sayed Abbas Haider Abidi, Tushar Shandhilya, Jaydeep Meda, Sharath HP, Abhishek Jaiswal.'

First Convolutional Layer (**8, 5x5 Filters with padding('same')** and '**relu**' activation.  
MaxPool with (**2x2**) **stride** and (**2x2**) **pool size**.  
Dropout with **20%** input set to **zero**.

Second Convolutional Layer (**8, 5x5 Filters with padding('same')** and '**relu**' activation.  
MaxPool with (**2x2**) **stride** and (**2x2**) **pool size**.  
Dropout with **20%** input set to **zero**.

Then the output was Flattened and Connected to a Fully Connected Layer with 128 neurons and relu activation.  
Final output layer with **26 neurons(output size)** and **softmax** activation.

### 3) Hyperparameters :

Hyper parameters used are

i) loss = **'categorical\_crossentropy'**

ii) optimizer = **'adam'**

iii) epochs = **24**

iv) batch size = **32**

These parameters and their values have been chosen by visible results and understanding the packages used.

### 4) Results :

Training loss : **0.0293**

Training accuracy : **0.9890**

Testing loss : **0.1907**

Testing accuracy : **0.95**