



# TensorFlow Gesture Recognition

Ram Bhattarai



# TensorFlow Stands for

**Tensor:** Multidimensional Array

**Flow:** A Graph of operations



# TensorFlow Overview

- Open Source Machine Learning Library
- Especially used for Deep Learning
- Provides researchers and developers to easily build and deploy ML powered applications.



# CNN- Convolutional Neural Network

Class of Deep neural network- Most commonly applied to analyzing visual imagery

Layers:

1. Convolutional
2. ReLu Layer
3. Pooling
4. Fully Connected

# Before going deep into what each layer means

How CNN Works?

CNN compares images piece by piece and features or commonalities in images

0	0	0	0	0	0	0
0	60	113	56	139	85	0
0	73	121	54	84	128	0
0	131	99	70	129	127	0
0	80	57	115	69	134	0
0	104	126	123	95	130	0
0	0	0	0	0	0	0

Kernel

0	-1	0
-1	5	-1
0	-1	0

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## Convolutional Layer- Math part

### Step 1:

Extract features from the image

### Step 2:

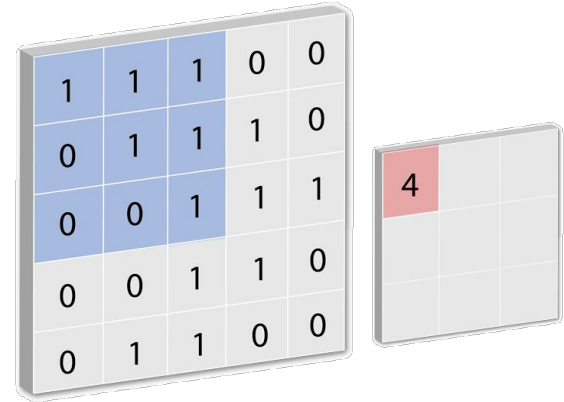
Multiply the each image pixel by the corresponding feature pixel

### Step 3:

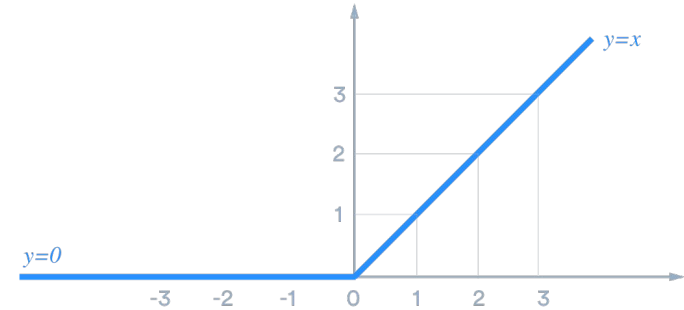
Add all the pixel values

### Step 4: Divide by the total number of pixels

Repeat the process until you are done with all the features



# ReLu Layer: Rectified Linear Unit



$$f(x) = \{ 0 \text{ if } x < 0, x \text{ if } x \geq 0 \}$$

Remove any negative values from the convolutional layer

Output

$f(x)$	$f(x) = x$	$F(x)$
-5	$f(-5) = 0$	0
-1	$f(-1) = 0$	0
1	$f(1) = 1$	1
2	$f(2) = 2$	2



# Pooling Layer

Reduce the computational complexity of the model and pass on the values that are important.

Also called downsampling

Used to control the overfitting





# Connected Layer

This is where all the neurons will be connected



# Code Walkthrough

[https://colab.research.google.com/drive/19DkmQ\\_8Lb8JsVLBLEwK9agTC4TDAj54x#scrollTo=RvQFrQmV4hRH](https://colab.research.google.com/drive/19DkmQ_8Lb8JsVLBLEwK9agTC4TDAj54x#scrollTo=RvQFrQmV4hRH)



# Steps overview

- 1) Resize image
- 2) Apply convolution with activation layer ReLu
- 3) Pooling
- 4) Repeat the process multiple times
- 5) Connect all the neurons
- 6) Train
- 7) Test



# Demo

<https://drive.google.com/file/d/1Np2c2ZnPdm7rj0QJS31xla3CdhXejwQy/view>