Report

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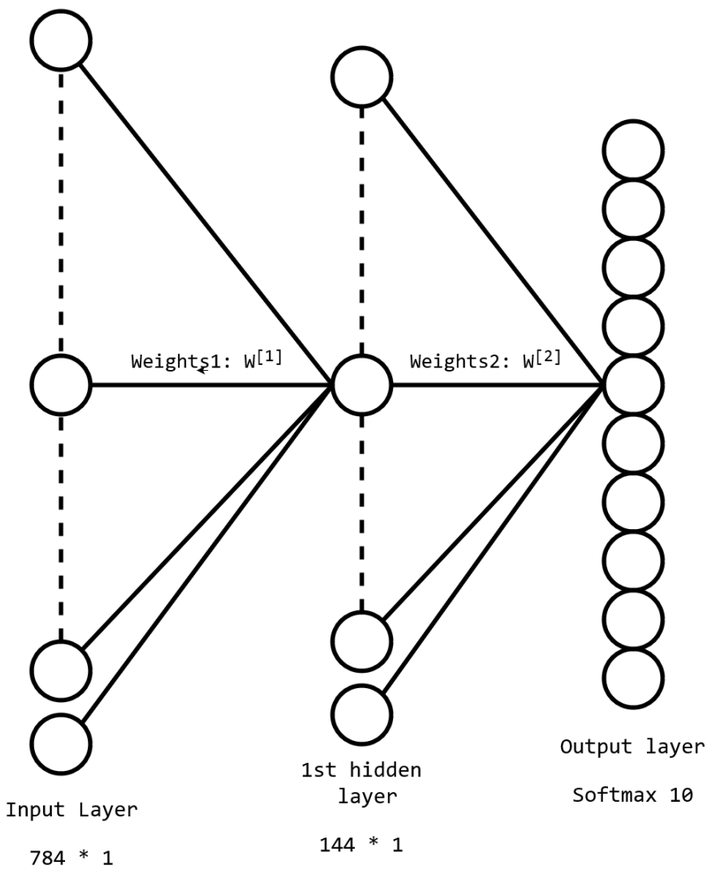
- We settle with 784 → 144 → 10 neural network



NOTATION FOR NODES
input : x
hiddenlayer : z
output : y

Obs:

1. --> relu >> Sigmoid/tanh
2. --> softmax >> Sigmoid
3. --> 2 choices
   1. 784 --> 512 --> 256 --> 10, accuracy:97.81, time: 19*10 sec
   2. 784 --> 128 --> 10, accuracy: 97.58, time: 8*10 sec
4. --> 10 epochs
5. --> adam, cross entropy,

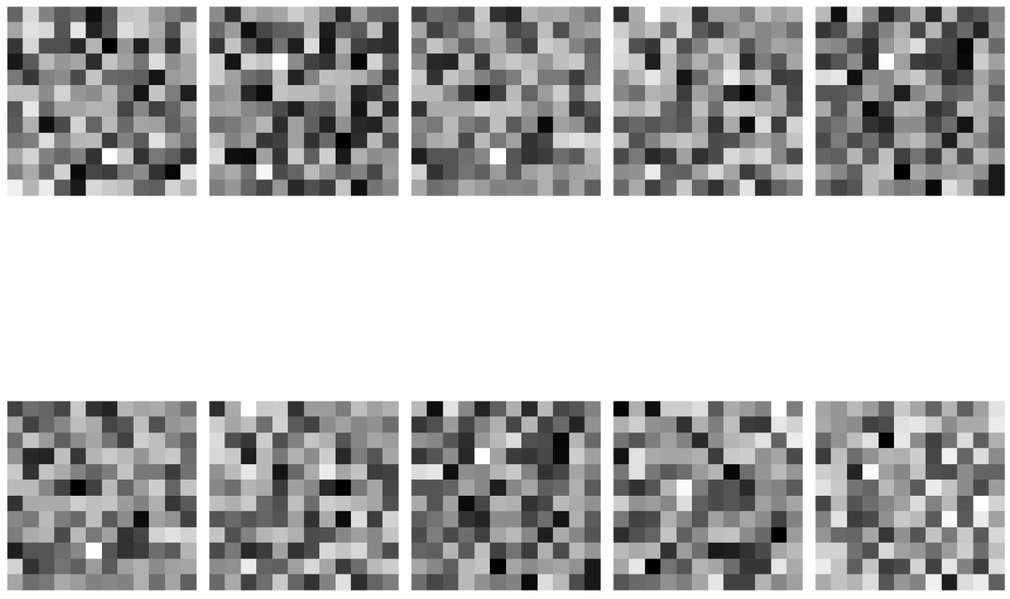
Note: going with 144 to have better visual representation

Weights 1

for $z_j^{[1]}$ we take the weights $W_j^{[1]}$ as a vector and reshape to 28*28 image, $j \in 1, 2, ..144$

Observation: Edge detection as evident from dark lines with light surroundings

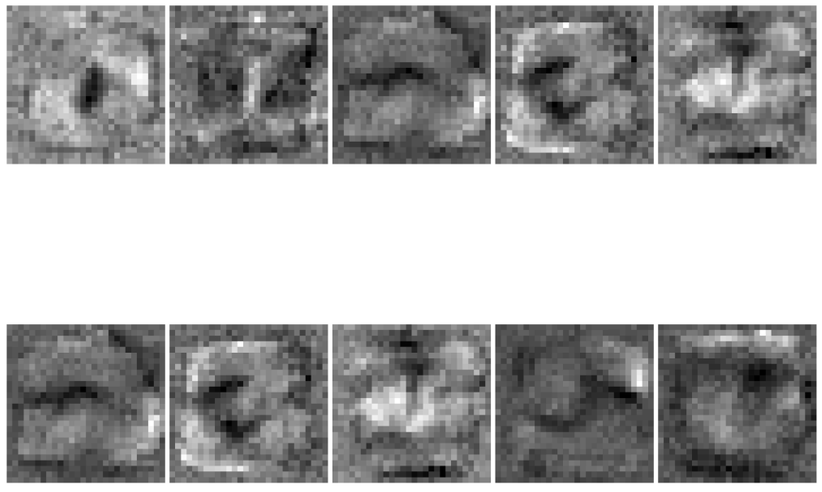
Weights 2

Similarly for y_k for $k \in 1, 2, 10$	

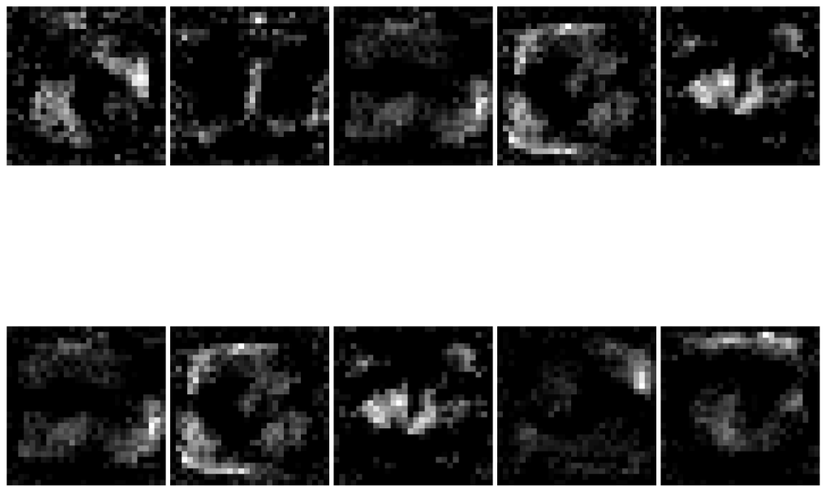
TRYING TO VISUALIZE

Although the operation is $Softmax((Wts^[2].T).Relu((W^[1].T).\vec{x})$
Where
$W^[1]$ is 784, 144
$W^[2]$ is 144, 10

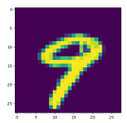
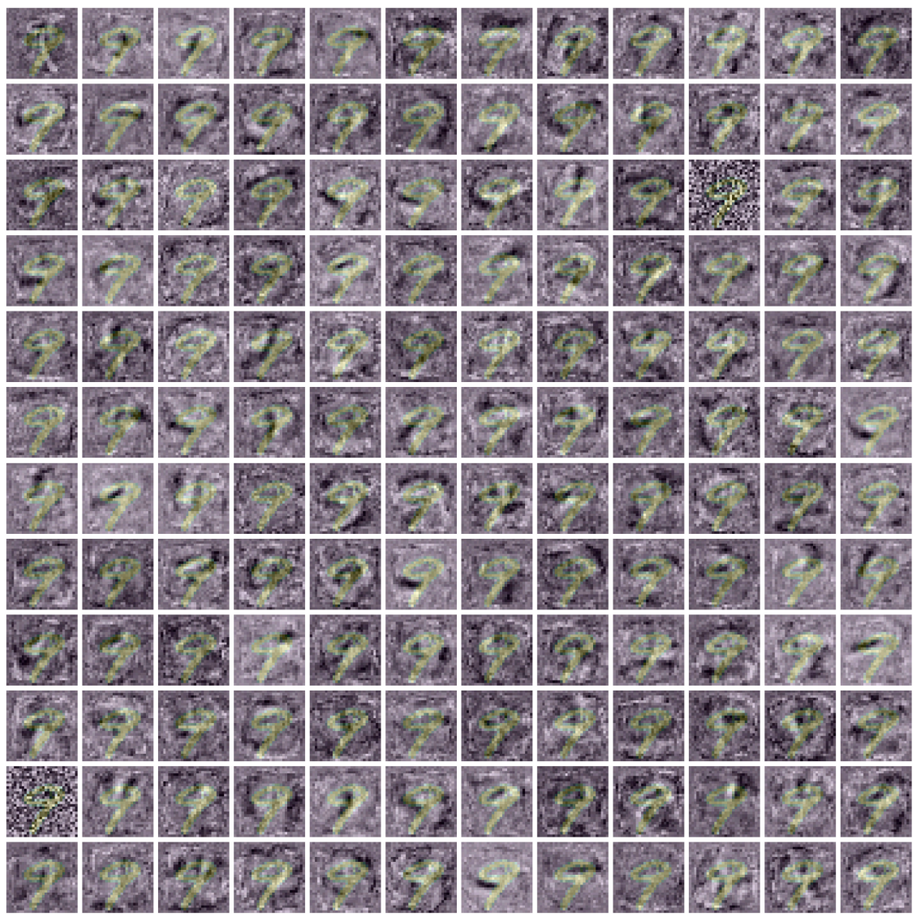
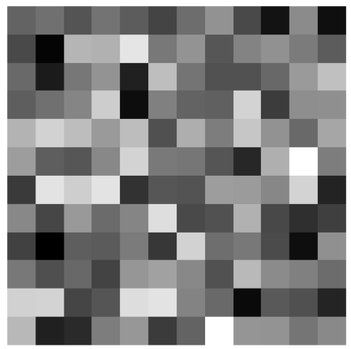
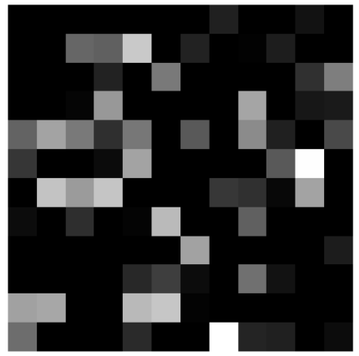
We try doing $W^[2].W^[1]$



Applying relu

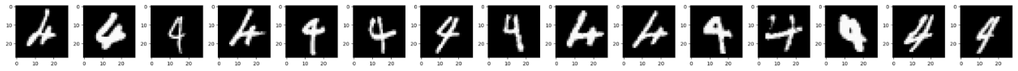


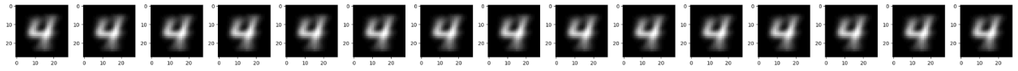
For example

		Wts1 . Image 	Applying relu 	Matmul With wts2	Array ([[-21.18016509], [-23.31676623], [-18.61824719], [-2.55331129], [0.35543724], [-17.5785729], [-24.88321004], [3.73750488], [-1.0280037], [14.8733955]])

Observation: *in general, where-ever dark edges and the relatively white part of image overlap and, we get a smaller value and vice versa*
(11, 6) = white
(9, 2) = cant predict
(1,1) = dark

Misclassified





OBSERVATIONS

Usually misclassified examples have something to do with the following properties:

brush stroke width

angle orientation

writing style

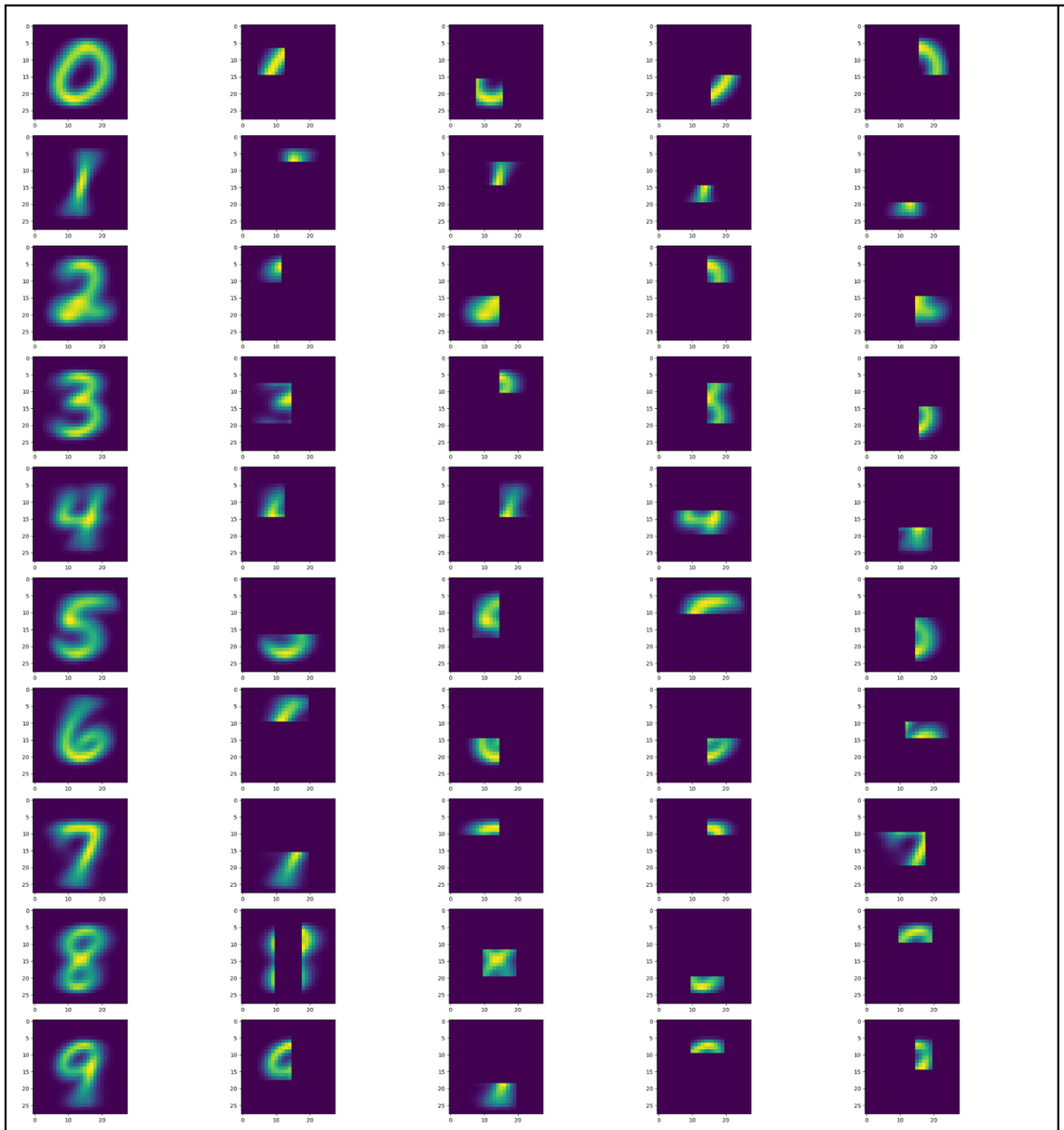
extra on screen

MORE WEIGHTAGE TO MISCLASSIFIED

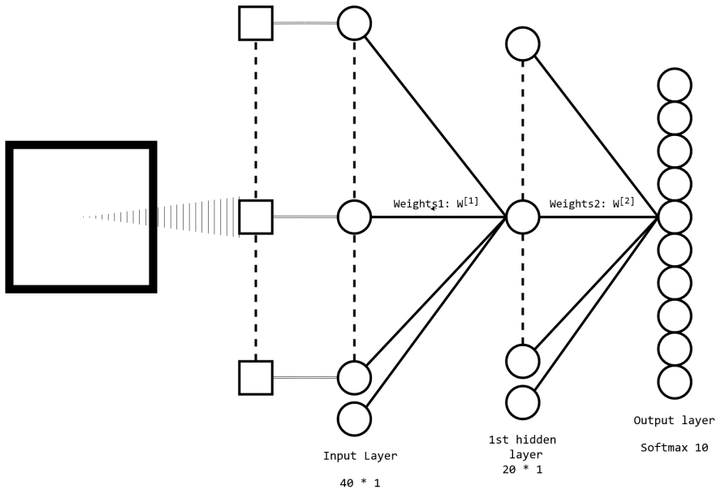
We observe that giving more weightage **doesn't** help in classifying misclassified examples correctly

PART2

Our Handcraft weights



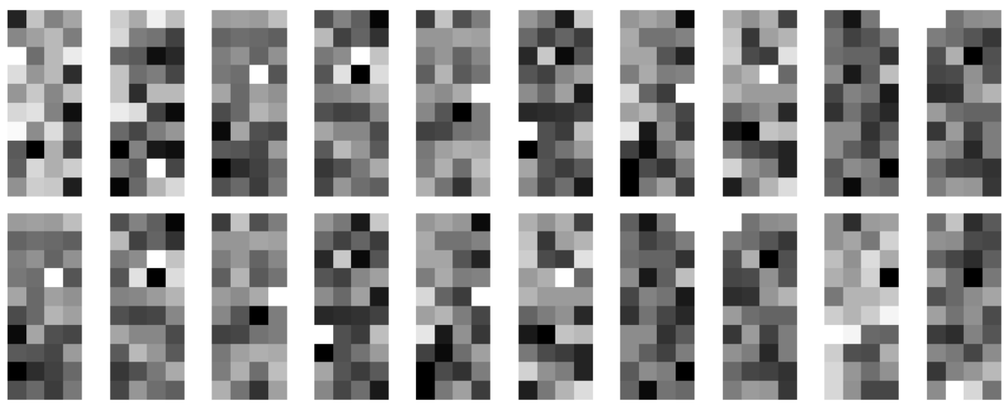
STRUCTURE



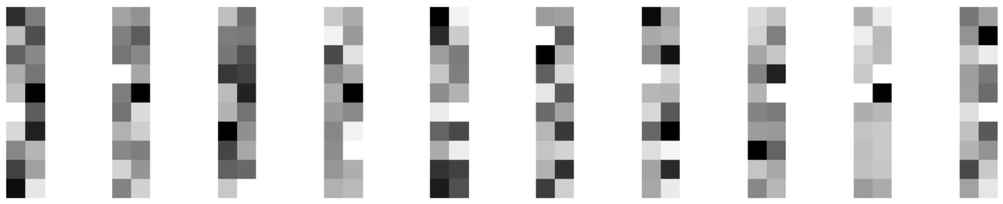
Wts0 (shape (40, 40))

Not visualizing as too big

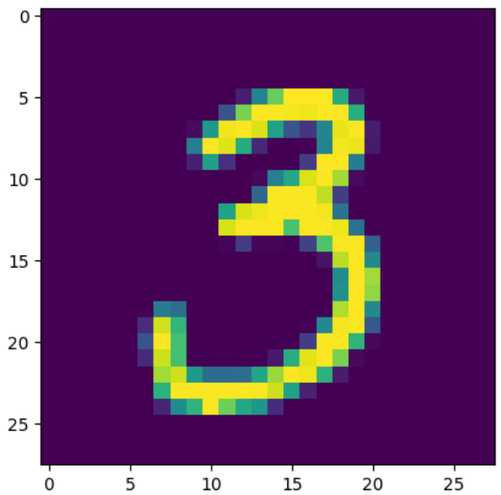
Wts1(shape (40,20))



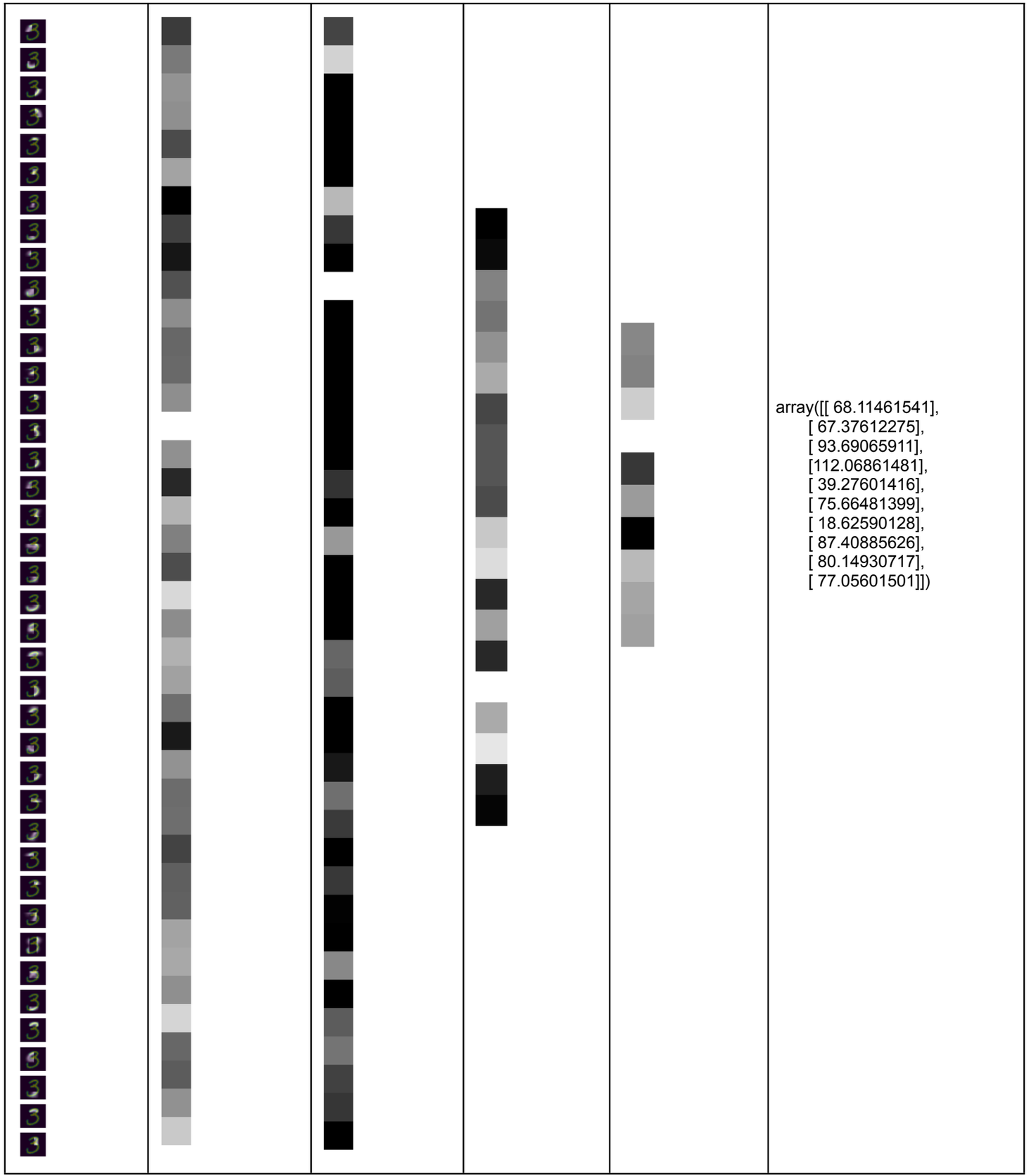
Wts2 (shape(20,10))



For Example



Wts overlapped	*Input of img*	*z=relu(input.wts0)*	*z=relu(z.wts1)*	*relu(z.wts2)*	=



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[87.40885626],
[80.14930717],
[77.05601501]])