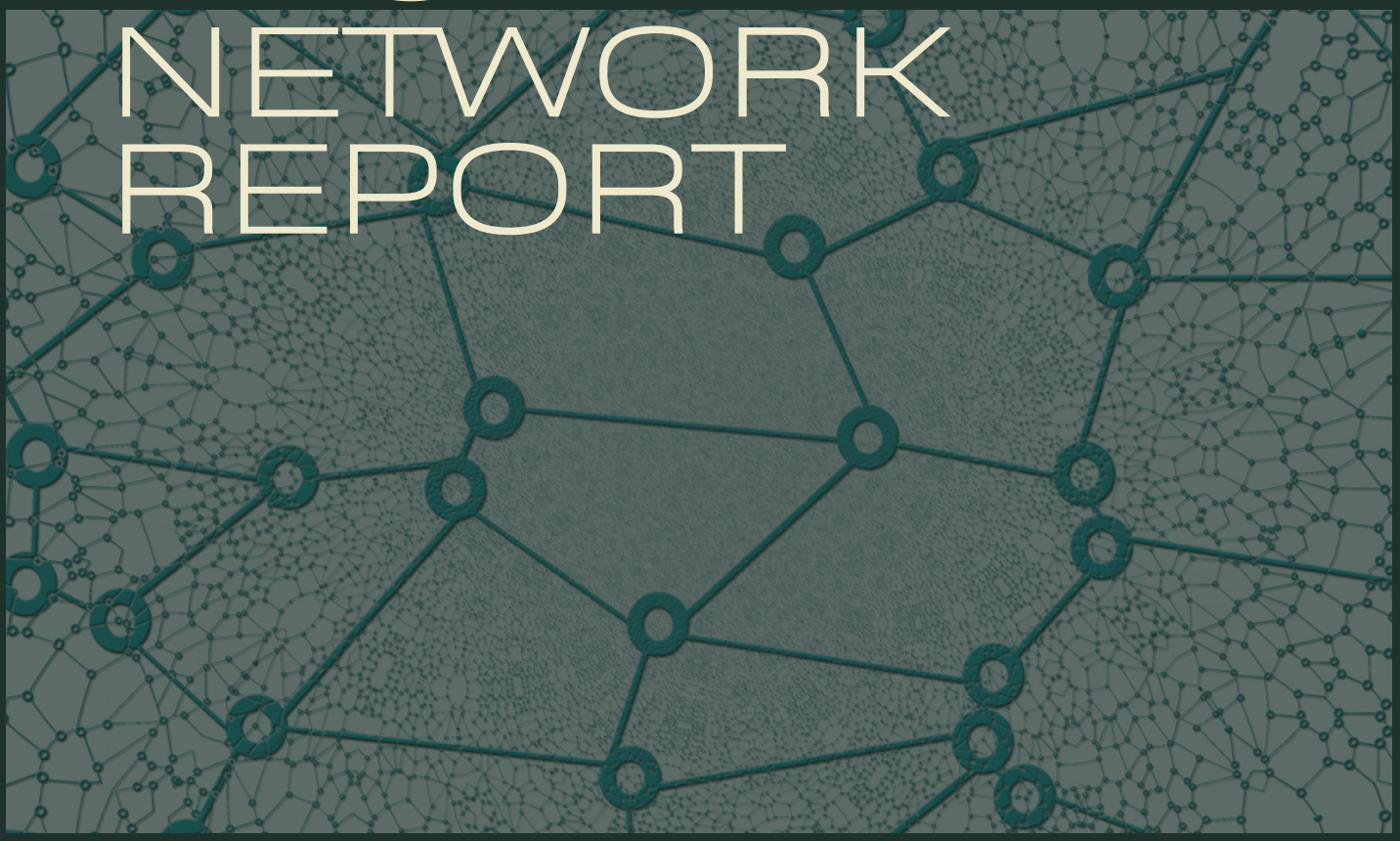
NEURAL NETWORK REPORT



Mariam ali 1001683
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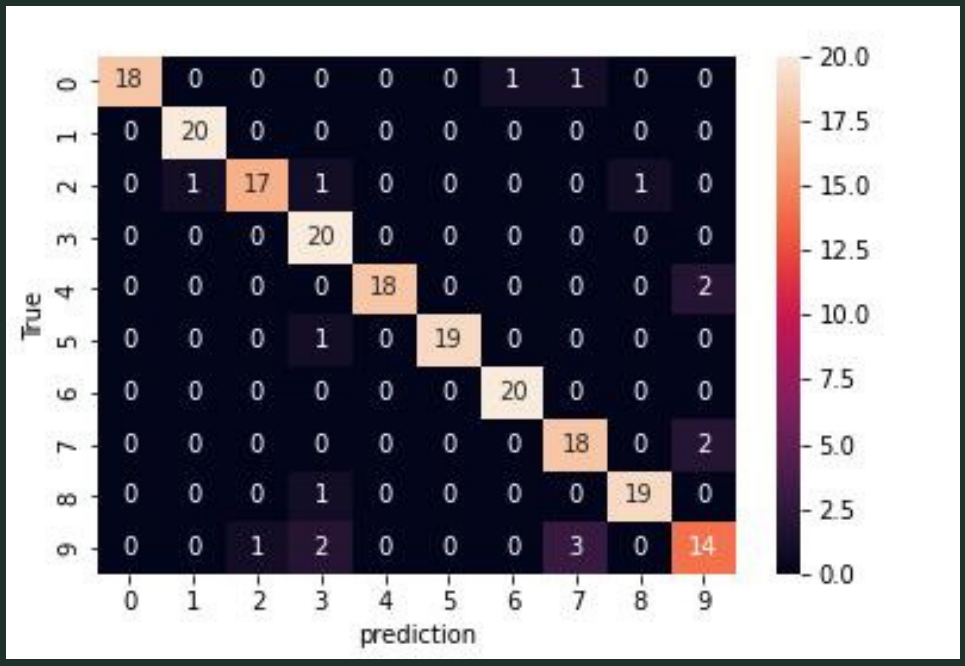
ASSIGNMENT 3

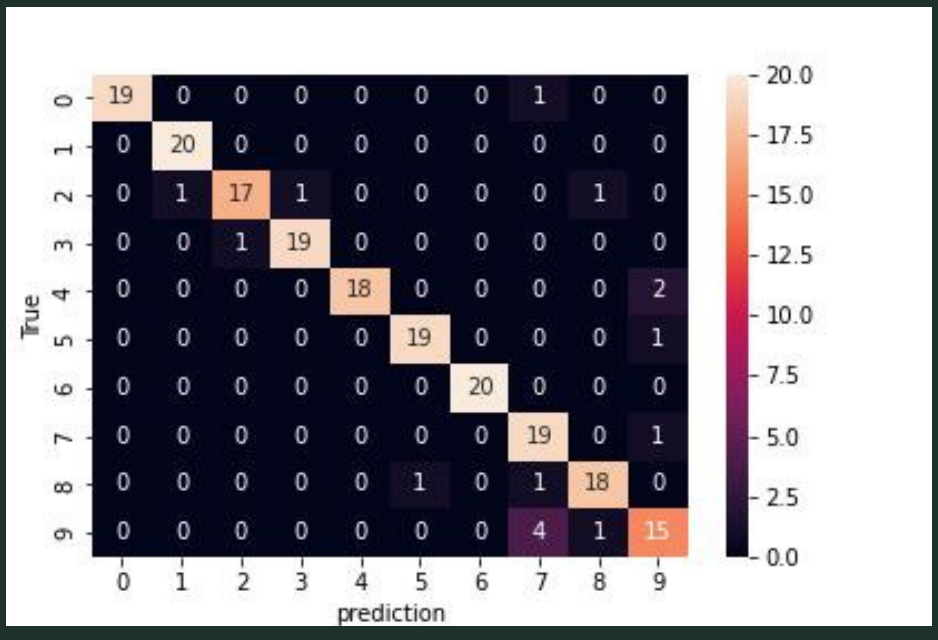
TABLE OF CONTENTS

Number of points that report should have about Multi layer neural network

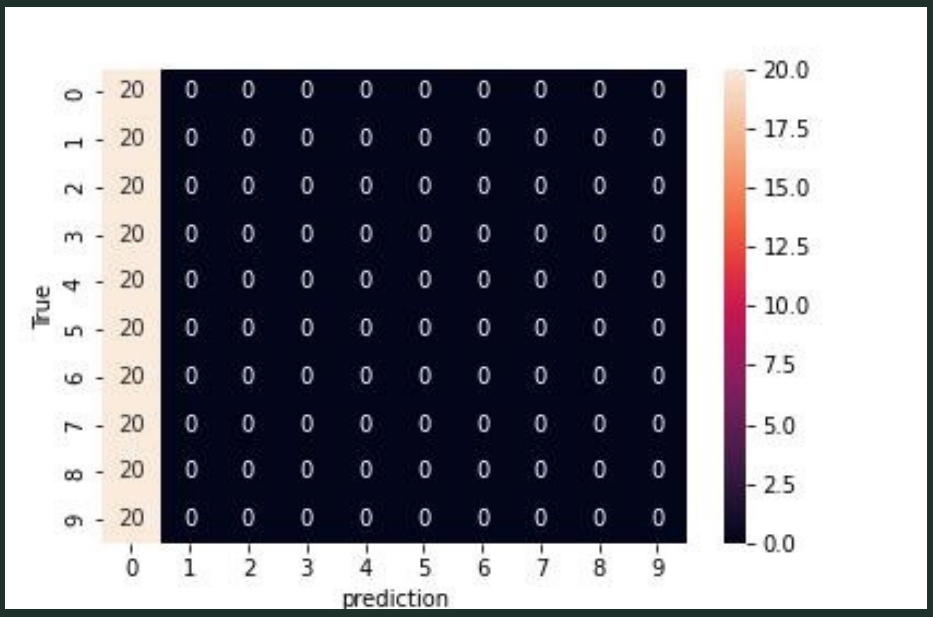
POINT 01 :
NEURON 500
LEARNING RATE : 0.001
EPOCHS:100
THE ACCURACY WAS EQUAL: 91.5%



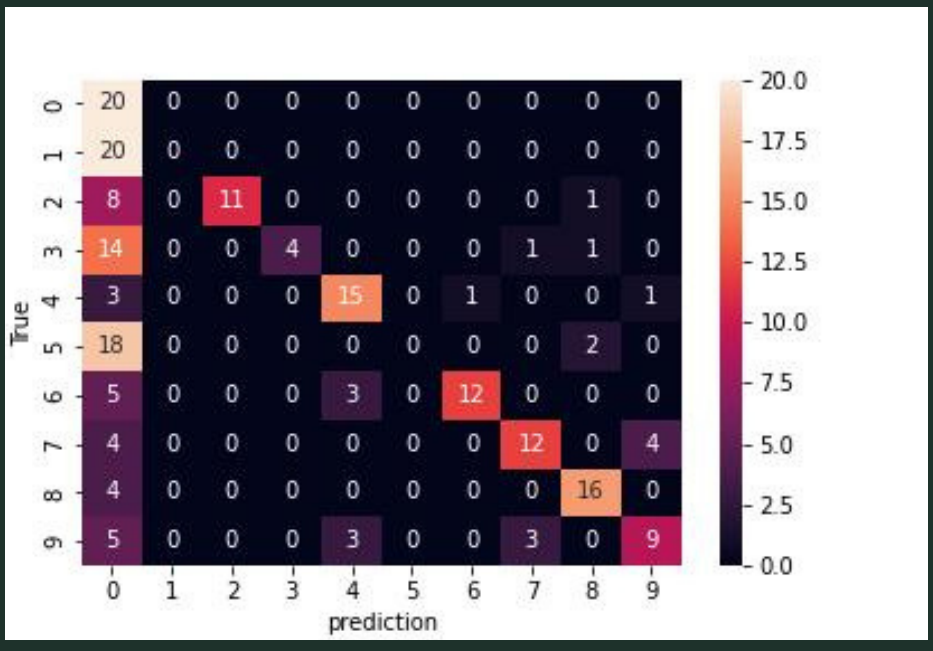
POINT 02 :
NEURON 500
LEARNING RATE : 0.001
EPOCHS:200
THE ACCURACY WAS EQUAL: 92%



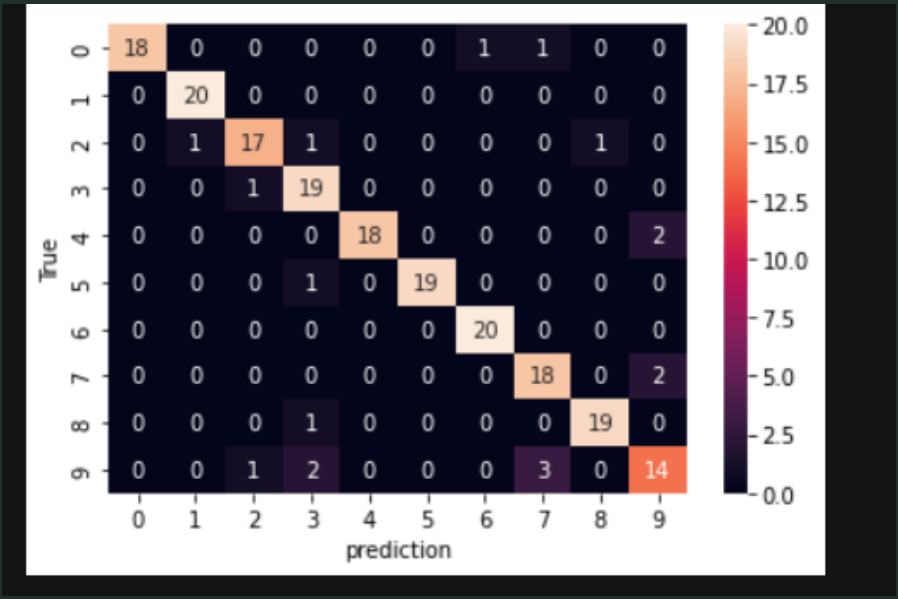
POINT 03 :
NEURON 500
LEARNING RATE: 0.001
EPOCHS:200 AND DATA ARE NOT STANDARDIZED
THE ACCURACY WAS EQUAL: 10%



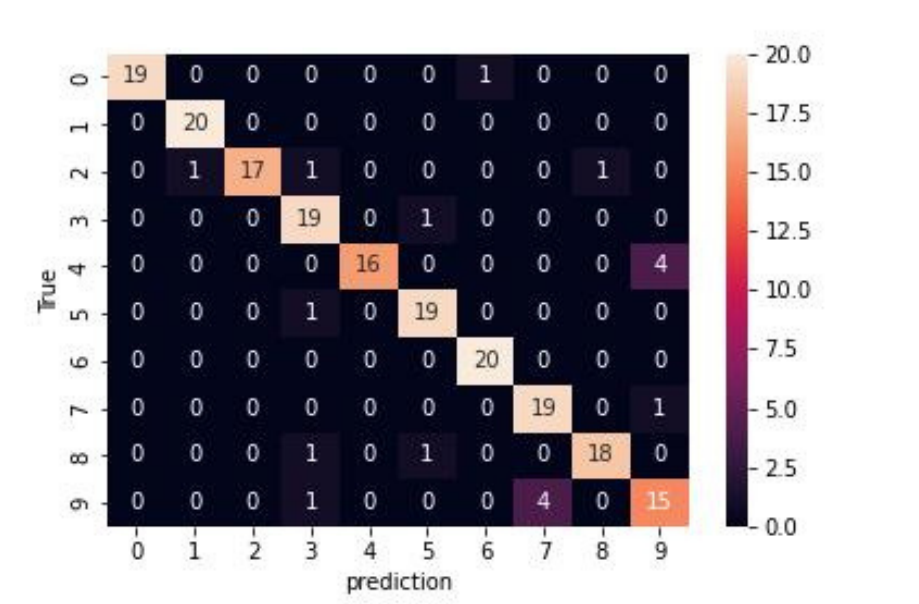
POINT 04 :
NEURON 500
LEARNING RATE : 0.01
EPOCHS:200
THE ACCURACY WAS EQUAL:49.5 %



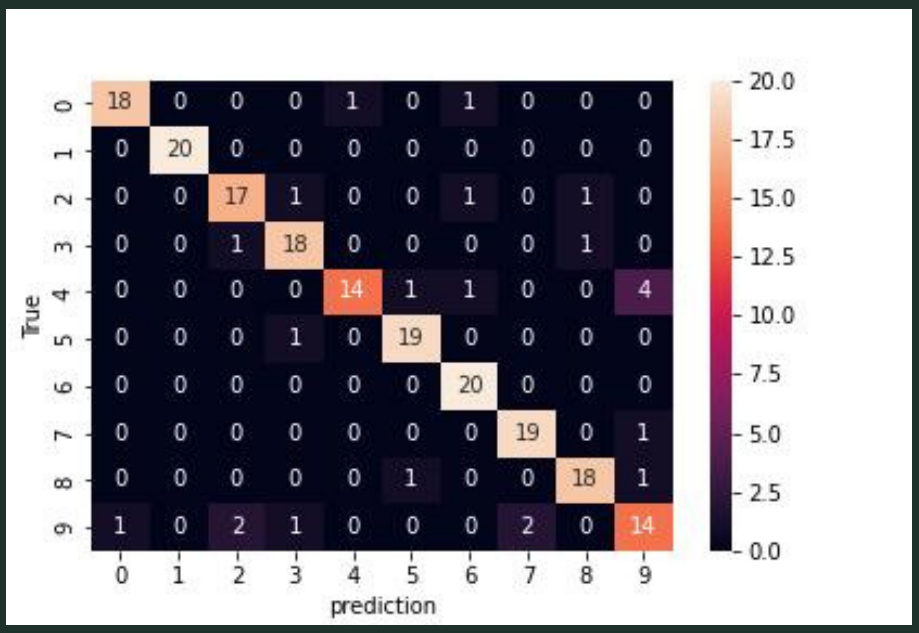
POINT 05 :
NEURON 500
LEARNING RATE : 0.0005
EPOCHS:200
THE ACCURACY WAS EQUAL: 91



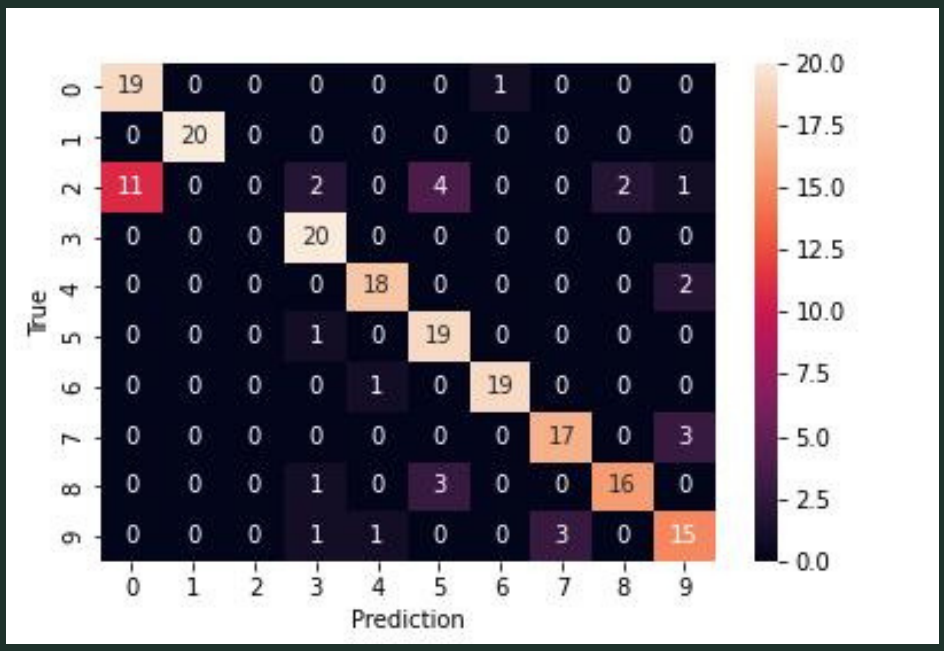
POINT 06 :
FIRST LAYER 500 AND SECOND LAYER 100
LEARNING RATE: 0.001
EPOCHS:200
THE ACCURACY WAS EQUAL: 91%



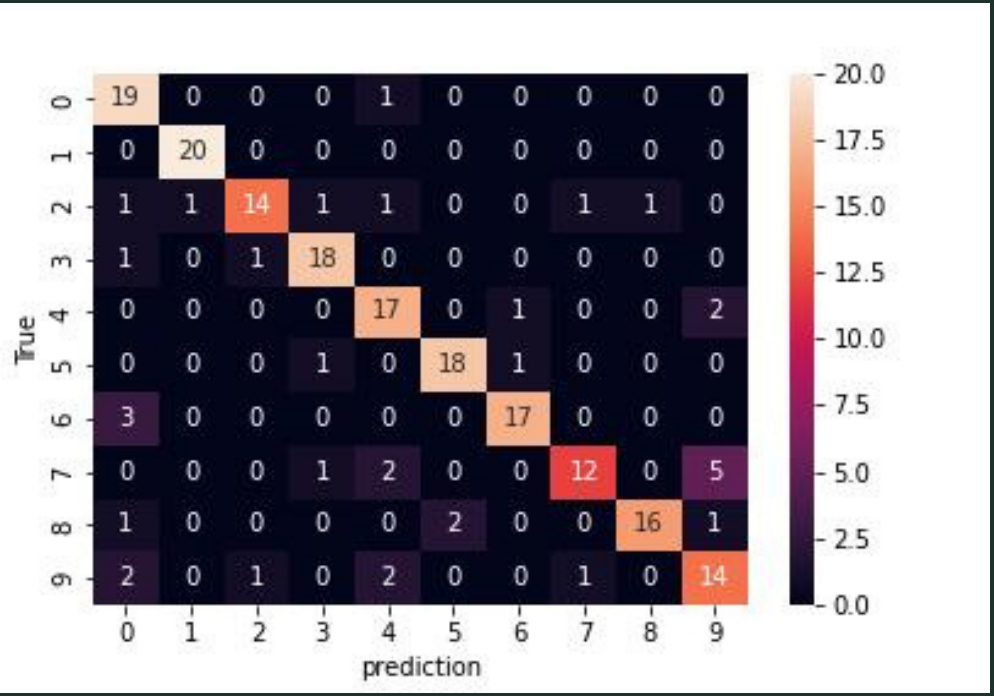
POINT 07 :
THE FIRST LAYER 500, SECOND 100 AND THE THIRD 50
LEARNING RATE : 0.001
EPOCHS:200
THE ACCURACY WAS EQUAL:88.5 %



POINT 08 :
THE FIRST LAYER 500, SECOND 100 , THE THIRD 50
AND THE FOURTH ONE 25
LEARNING RATE : 0.001
EPOCHS:200
THE ACCURACY WAS EQUAL: 81.5%



POINT 09 :
THE FIRST LAYER 500, SECOND 100 , THE THIRD 50
AND THE FOURTH ONE 25
LEARNING RATE : 0.001
EPOCHS:2 AND BATCH SIZE 1
THE ACCURACY WAS EQUAL: 82.5%



OUR OBSERVATION OF 4 QUESTIONS

1

What do you observe about increasing the number of epochs?

Based on accuracy of the first point which is equal to 91.5 and second one which is equals to 92
This means that the second is better than the first since increasing the epochs means increasing the number of iterations to train the model and the model will improve every time epochs increase and will predict more digits right

2

What do you observe about the need for standardization?

The standardization dataset means that transformation of features by subtracting from mean and dividing by standard deviation and it's comes when we have large differences between their ranges and by that the scale of the feature become same and percentage of accuracy through doing the standardization was 92% and when we don't standardize the data and scale of feature was so difference and can't compute a suitable model that fit the data ,it becomes equal to 10% which is so bad and almost all the predict by that model was wrong to guess the digit that on the image

OUR OBSERVATION OF 4 QUESTIONS

3

What do you observe about changing the learning rate?

The learning rate is a hyperparameter that controls how much to change the model in response to the estimated error each time the model weights are updated ,Based on numbers when I changed the learning rate to be bigger the accuracy decreased and becomes so bad and was equal to 49.5% while in the other the accuracy was much better since rate was more accurate with the estimated error and changing the model and the one of learning rate that fit the data was 0.001 and model train epochs equal to 200 by percentage 92%

4

What do you observe about the speed of training one epoch with batch size 1? Explain the reason

The batch size means: the number of samples that will be propagated through the network and The smaller the batch the less accurate the estimate of the gradient will be and one epoch = one forward pass and one backward pass of all the training example
so it will be slower since it will take all the data at the same time and model them but when we don't specify the value of it like other points it's by default 32
and will be faster since every iteration take 75 to train on them