

# Assignment - 1

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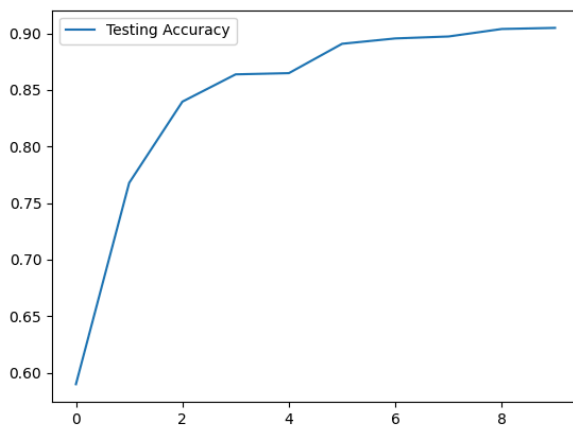
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## Evaluation

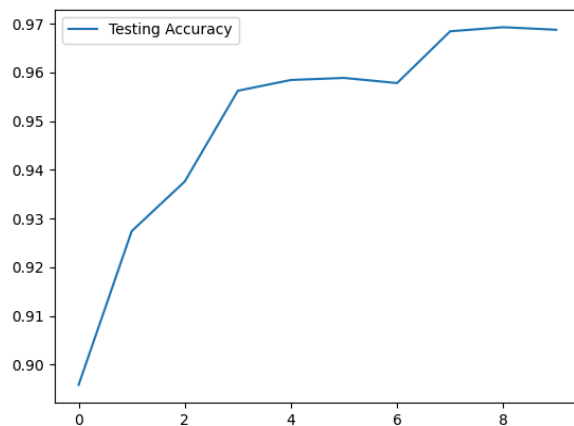
### Experiment 1: Training a CNN with Original MNIST Data

MNIST Data contains around 50,000 Training Data.

We first train our CNN model with 1% of the original data. We observe that it does not pass the monitoring script and hence we retrain our model with 5% of the original data and we see that this time, the model passes the monitoring script. The graph below shows the accuracy curve for both the experiments.



Acc: 91.76% for 1% of Data



Acc: 97.85% for 5% of Data

Here we train for 10 epochs with a learning rate of  $1e-3$  and a batch size of 32

From here on, we will be using 5% of data for all our experiments.

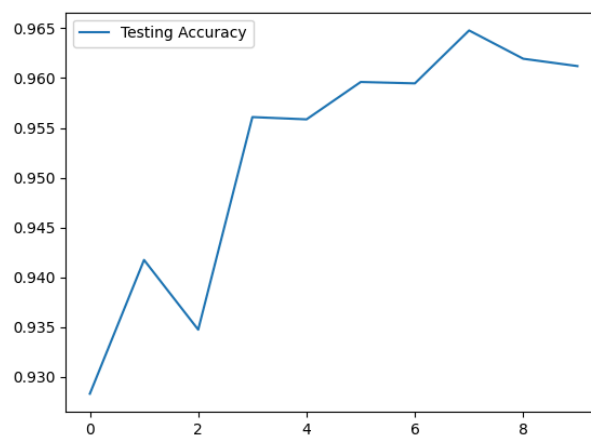
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## Experiment 2: Adding a shift in data

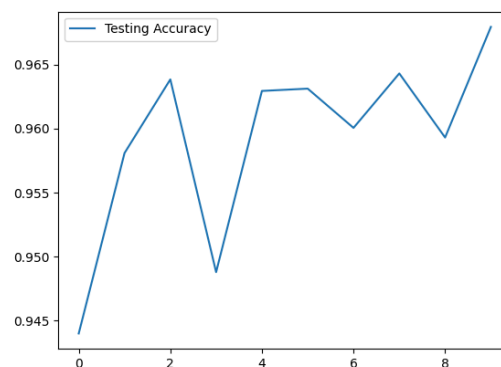
Now, we add a shift in the data by adding data rotated by -30 degrees. When we use the previous model and evaluate this data, we see that there is a drop in accuracy to 70%.

So now, we add the data with -30 degrees rotation into the train set and train the model again and test it and see that the accuracy has raised to 96.19%. The graph below shows the accuracy curve for the experiment.



## Experiment 3: Adding all different rotations in the training data.

We now add all different rotations(-20, -10, 10, 20, 30) in the training set and train and test our model. We see that our model is robust enough now to handle the different rotations in the data and gets an accuracy of 96.36%. The graph below shows the accuracy curve for the experiment.



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## Task Specific Code/Experiments

### Task 1 & Task 2:

The codes for the above 2 tasks are in the generate\_dataset.py file.

### Task 3: Hyperparameter Tuning

*Learning Rate Tuning:* We test with 3 different learning rates 0.01, 0.001 & 0.0001

Learning Rate	Accuracy
0.01	96.25
0.001	97.34
0.0001	91.75

*No of Channels in the Model:* We test with 3 different channels - 8, 16 & 32

No of Channels	Accuracy
8	93.90
16	97.85
32	96.32

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*Kernel Size of ConvNet:* We test with 3 different kernel sizes - 3 & 4 & 5

Kernel Size	Accuracy
3	95.89
4	97.46
5	95.19

#### **Task 4: Monitor Script**

The code for monitoring is in the monitor\_perf.py file