RECOGNITION OF HANDWRITTEN NUMERICAL DIGITS BY CONVOLUTIONAL NEURAL NETWORKS ALGORITHMS
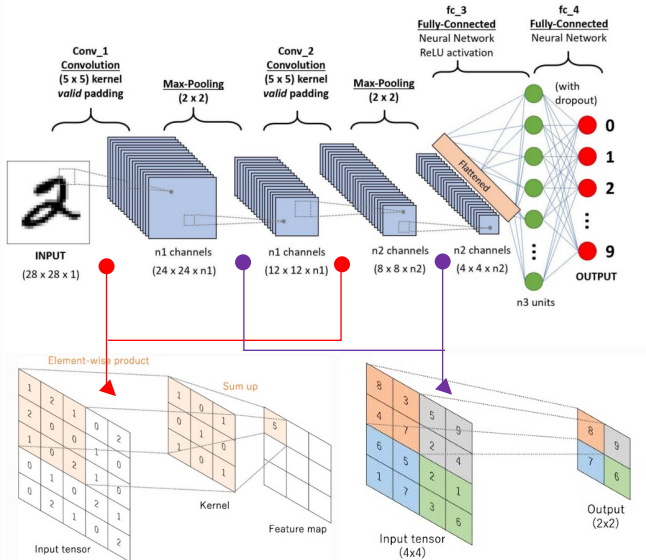
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INTRODUCTION

In this project, the convolutional neural network structure created for the recognition of handwritten numbers. All parameters have been individually tested and optimized for the best result.

SPECIFICATIONS AND DESIGN REQUIREMENTS

Input Data: The MNIST dataset was used in this Project.

70,000 data :
60,000 images for train
10,000 images for test

❖ In the convolution layer, the filters are randomly assigned by the program.

SOLUTION METHODOLOGY

❖ The following changes have been made on the network, which parameter effects on learning:
1. Changing 'Feature-Map' numbers (n1=16 & n2=32 obtained)
2. Changing Max-Pooling Layer numbers (2 obtained)
3. Changing Epoch (Optimum 5 obtained)
4. Adding Gaussian Noise
5. Adding Salt&Pepper Noise
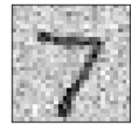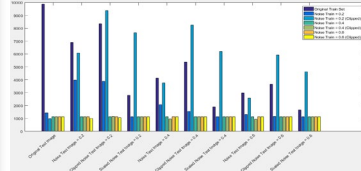6. Adding Dark Patches
7. Rotating Image

APPLICATION AREAS

Handwritten numerals recognition using a neural network can be used in processing information containing handwritten digits such as recognizing address numbers on packages and letters and telephone numbers.
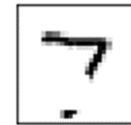
RESULTS AND DISCUSSION

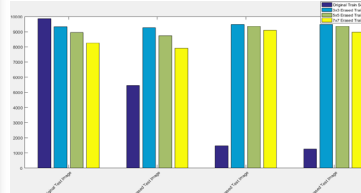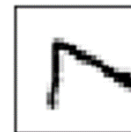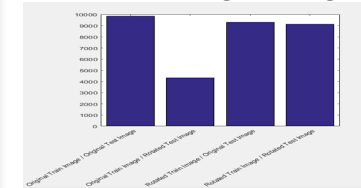1. Result of Adding Gaussian Noise to Training & Test Data

2. Result of Adding Salt&Pepper Noise to Training&Test Data
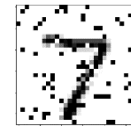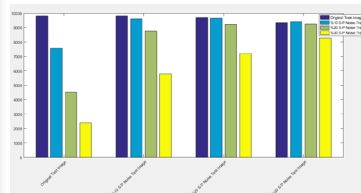
3. Result of Dark Patches Applied on Training & Test Data

4. Result of Rotating Training and Test Data

❖ In all cases, it has been observed that if the test data is distorted, training with little distorted training data gives better results.

REFERENCES

❖ https://insightsimaging.springeropen.com/articles/10.1007/s13244-018-0639-9

ACKNOWLEDGEMENTS