Textile Defect Detection

HACKFEST 2021

TEAM FIVE PHOENIX

IIT(ISM) DHANBAD

PROBLEM

During the process of knitting a textile fabric frame, several types of defects may occur. The manual detection of these defects is quite tedious and time consuming which lowers the production rate. So, there is a need for an automated system to do the job.

DESCRIPTION

The basic idea and objective of this project is to develop a model that automatically detects the defects in fabric and gives command to the machine to perform the necessary action.

Analyzing our dataset–

I have taken this textile defect detection dataset from Kaggle. It consists of data stored in the form of hierarchical data format. Each test and training set contains about 48000 images, however I have trained the data set on approximately 6000 images each.

You can get this dataset at the following link

https://www.kaggle.com/belkhirnacim/textiledefectdetection

Each image when converted into a NumPy array is of Dimension (64x64x1).
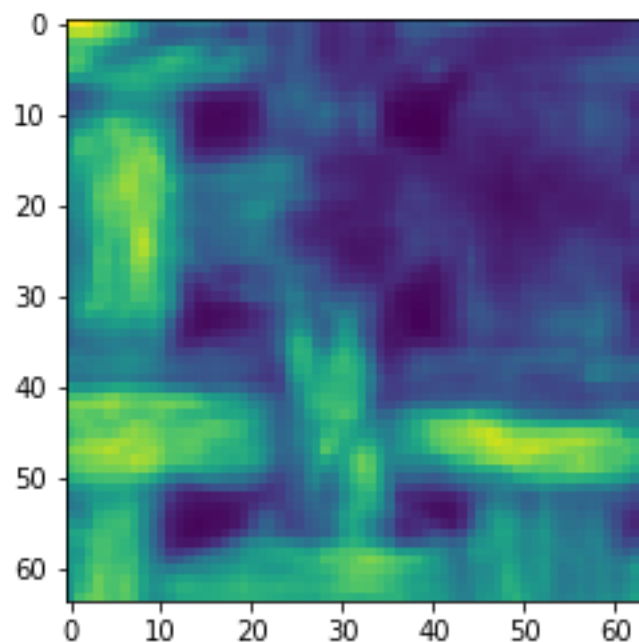
This is one of the example.

What your model does is that it takes these arrays, unroll them making each image represent a (64x64,1) matrix.

Then we run this matrix through our model which after performing a large number of iterations decides the correct parameters.

We see the images naturally and recognize them but the computer sees them as matrix(just numbers).

Let me give you a brief insight about neural networks

IT IS JUST A SMALL BRAIN!!!

It is a class of algorithms that takes inspiration from neural structure of human brain. The main aim is to develop an algorithm that takes input in various nodes of a layer and then produces an output after processing through a number of layers. The weights and bias are optimized after training on different data sets. Sigmoid function is also used to produce output as probability.
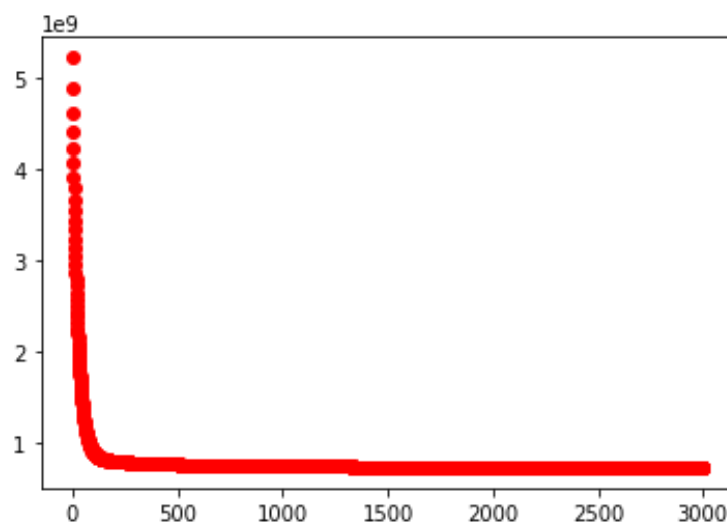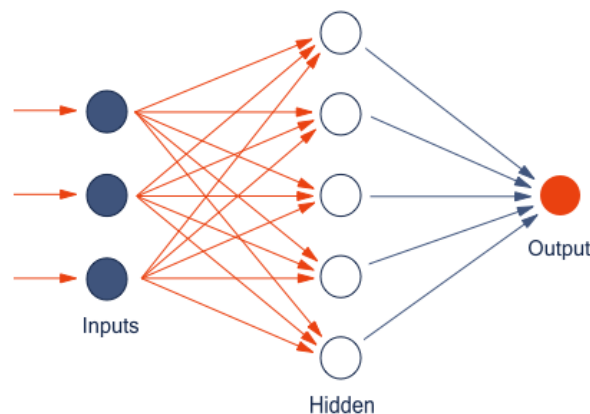
The best suited algorithm for this purpose is neural networks. I have created one with 2 layers each containing 5 nodes.

input layer   hidden layer 1   hidden layer 2   output layer
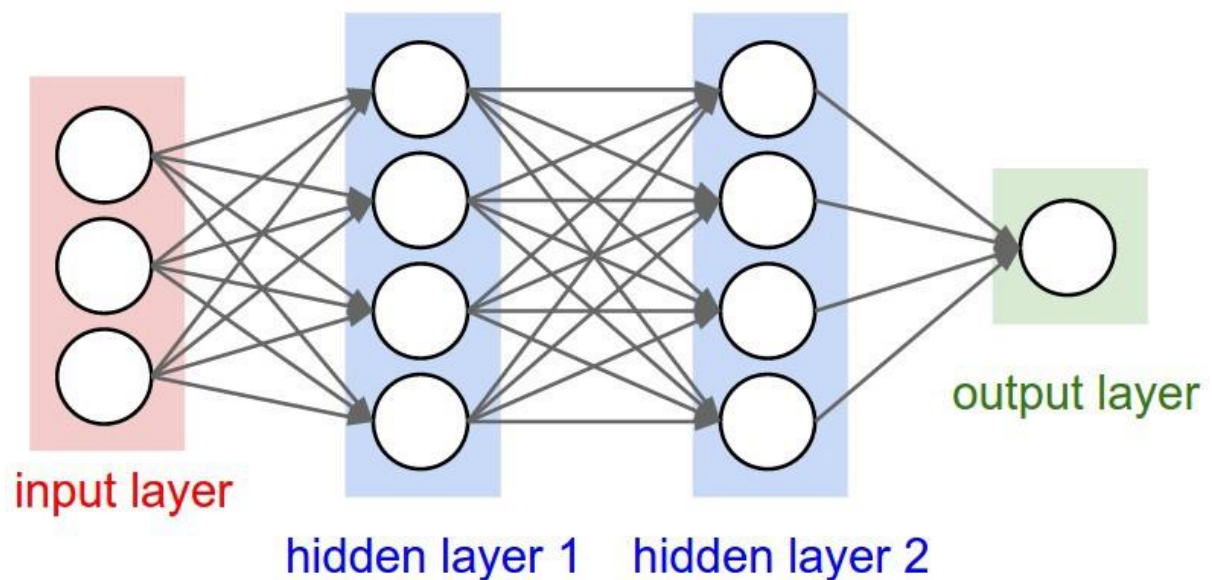
Finally, after running a large number of iterations, our cost is reduced and it becomes constant. We get an accuracy of almost 83% on train set and 84% on test set.

No Defect

Defect Detected

TECH STACK

- Python

-Various libraries like NumPy, matplotlib, os, cv2, scikit-learn, pandas etc.

-Jupyter notebooks

TEAM MEMBERS

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