Foft Computing Project 4

Can you write some codes in Matlab or Python that for a given crack picture on a reinforced concrete element determines the crack type ? Use a perceptron model to classify the crack as "safe" or "unsafe" based?

A: Rewrite the program (you can also use python) based on the example given to you below, extend and correct the program in case it is not complete or it causes errors when you run it.

B: Run the program with the sample date existing on internet.

C: Print the input data and output data for a real example

D: Explain your steps in solving this problem using a flowchart based on what you have learned in the Soft Computung Course.

Here's an example MATLAB code that uses a perceptron model to classify the crack type on a reinforced concrete element as "safe" or "unsafe":

matlab

% Perceptron Model for Crack Type Classification

% Training data

inputs = [

   % Features extracted from crack images (e.g., length, width, orientation)

   2, 0.5, 30; % Example input 1

   3, 0.8, 45; % Example input 2

   % Add more input data as needed

];

targets = [0; 1; % 0: Safe, 1: Unsafe

   % Add more target data as needed

];

% Create and train perceptron model

net = perceptron;

net.trainParam.epochs = 100; % Number of training epochs

% Train the model

```
net = train(net, inputs', targets');


% Test data
testInputs = [
    2.5, 0.7, 60;  % Example test input 1
    % Add more test inputs as needed
];


% Classify the test data
testOutputs = net(testInputs');


% Display the results
disp("Crack Type Classification Results:");
for i = 1:length(testOutputs)
    if testOutputs(i) == 0
        disp("Safe");
    else
        disp("Unsafe");
    end
end
```

In this example, the training data consists of inputs representing features extracted from crack images, such as crack length, crack width, and crack orientation. The targets indicate whether each crack is classified as "safe" or "unsafe".

The perceptron model is trained using this data, and the number of training epochs is set to 100.

The test data represents new crack images that need to be classified. The trained perceptron model is then used to classify these test inputs as either "safe" or "unsafe" based on the learned decision boundary.

For example, if you run the code as is, you should see the following output:

graphql

Crack Type Classification Results:

Safe

This indicates that the test input [2.5, 0.7, 60] is classified as "Safe" based on the trained perceptron model.

Note that this is a simple example, and in practice, you would need a larger and more diverse dataset of crack images to train a perceptron model effectively. Additionally, you may need to modify the code and adjust the model parameters according to your specific requirements.