Embedded Systems and Robotics that Improving Security Model with 2D and 3D of Face - Recognition Access Control System using Neural Networks

Roop Singh Takur, E.Ramkumar

Abstract:- Recognition and Sensor monitor Control are the basic tasks performed by Artificial Neural Networks. In this paper we present new technology for Security reasons. That is Robots and Embedded systems Using Camera inside the devices. By using sensor controls we can captures the photos and videos of the crimes and terrorists activities performing by human beings. Embedded Systems devices such as LED TV, Car, Air conditioners where we are using in Airports and Markets, Bus stations, Railway stations so on. Especially in public places. By using these method crimes will be reduced greater Extent. Some countries are using robots for security purpose and in other countries we are using embedded systems for Entertainments, announcements, air, travelling purpose. They are using embedded applications inside. I am going to show by keeping cameras inside into that we can also performs Face recognition in 2D and 3D.Here in this paper using Back propagation algorithm is used to detect the face in proper manner and right direction without any errors and transferred images into memories in micro controller chip.

Keywords Artificial Neural Networks, Back propagation, 3D-Model-Face recognition, Robots, Embedded systems.

I. INTRODUCTION

Face recognized by a machine can be described as an interpretation of human facial characteristics via mathematical algorithms. Face of the body is read by an input sensing device such as a web-cam take the image in the 2D and 3D view. It reads the movements of the face of the body in 2D and 3D then Communicates with robot neural system and embedded system micro controller that uses these gestures as an input. These gestures are then interpreted using algorithm either based on back propagation technique. The primary goal of Face recognition research is to create a system which can provide more security in society for people and showing more Evidences about crimes to the cops . By observing face, one can decide whether a man is correct identity for data, privacy of applications verifying personal identity. Recognizing the face of a man can help in many of the areas like in the field of security they can easily find the faces who done mistakes in financial applications. Where in Airports they can easily find the faces of passengers.

The webcam is scan that in 2D and 3D of passengers face then it stores. So if any crimes have taken place so that they can catch the culprit from any other embedded systems such as cars at parking, led TV at airports, bus stations so on. Here I am trying increase more security for common people.

II. BACK PROPAGATION ALGORITHM

Image recognition has been done in the past using image pixels to train a neural network via back-propagation. A typical ANN has N inputs and one or more output as shown in fig. 1. The Input layer is composed not of full neurons, but rather consists simply of the values in a data record, that constitutes inputs to the next layer of neurons. The next layer is called a hidden layer and there may be several hidden layers. The final layer is the output layer, where there is one node for each class. A single sweep forward through the network results in the assignment of a value to each output node, and the record is assigned to whichever class's node had the highest value. These actual pixels are fed into the network as the inputs. This approach works great when trying to recognize textures or objects with fixed orientation and scale. However, at Different scale and orientation, it doesn't give encouraging results. Therefore tokens of an image used during training, the network are trained to associate outputs with input patterns. When the network is trained, it identifies the input pattern and tries to output the associated output pattern. In order to train a neural network to perform some task, we Must adjust the weights of each unit in such a way that the error between the desired output and the actual output is reduced. This process requires that the neural network to compute the error derivative of the weights (EW). In other words, it must calculate how the error changes as each weight is increased or decreased slightly. The back propagation algorithm is the most widely used method for determining the EW. The power of neural networks is realized when a pattern of tokens, during testing, is given as an input and it identifies the matching pattern it has already learned during training.

Once you have guessed the error in hidden layer we have updating of weight rules exactly of these. Now we can go through the analysis quickly. At the output layer let we talk about the multilayer networks where the error propagates back from the output layer to the hidden layer until it gets input layer.

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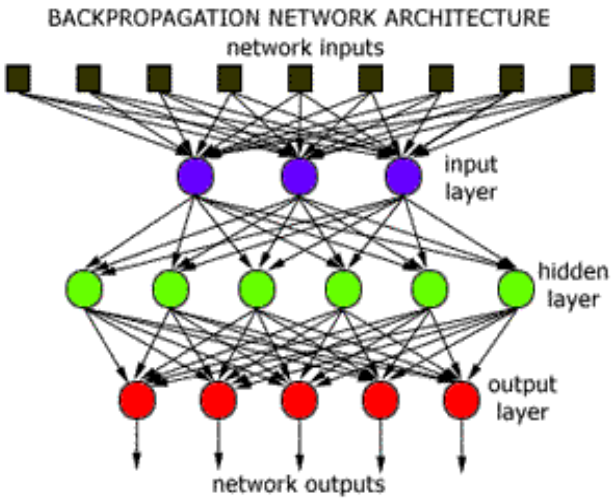


Fig 1- Error Propagation (Defining)

$E = ½ Err^2$

$= ½ (y – hw(x))^2$

$= ½ (y – a_i)$

$\partial E / \partial W_j = \partial / \partial W_j (1/2\ Err^2)$

$= Err * \partial Err / \partial W_j$

$= Err * (- \partial / \partial_{wj} g (\sum W_j x_j))$

$= -Err * g(in) * x_j$

[Therefore this is the term where we have is the error has to change in the weight]

[Therefore we are using Gradient Descent below]

$W_j \leftarrow W_j + \alpha * Err * g'(in) * x_j$

Where $\Delta_i = Err * g'(in) * x$

Training said that actually it don't know the actual output of the hidden layer neuron.so idea has to take the errors of the actual output of the neuron top layer and make a proportionally distribution back to the hidden layer. That is why we have back Propagation learning. It will compute the errors in the output layer and Back propagates into the hidden layer. So that we have some heuristic in the hidden layer. So actually we don't know what the hidden layers having errors in neuron .But some blame goes to hidden layers having errors it is a part of output layer neuron. So that we can take fraction of errors and propagates into the back of the hidden layers.

Multilayer learning algorithm is going to formalized

$W_{ji} \leftarrow W_{j,I} + \alpha * a_j * \Delta_i$

Where $\Delta_i = Err_I * g'(in_i)$

How do we compute the errors in this unit. That's why Back propagation comes into act

$\Delta_J = g'(in_i) (\sum W_{J,I} \Delta_i)$

Now the formula is fed into another layer

$\Delta_J = g'(in_i) \sum W_{J,I} \Delta_i$

$W_{k,,j} + \alpha * a_{k*} \Delta_j$

By these two formulas we are using Back Propagation Δ_i and Δ_j different layers of th e neurons.

Declaration of the formula 1:

$\partial E / \partial W_{k,j} = -\sum_i (y_i – a_i) \partial a_i / \partial W_{k,j}$

$= -\sum_i (y_i – a_i) \partial g(in_i / \partial W_{k,j})$

$= -\sum_i (y_i – a_i)\ g'(in_i) \partial (in_i) / \partial W_{k,j}$

$= -\sum_i \Delta i\ \partial / W_{k,j} (\sum W_{j,I}, aj')$

$= -\sum_i \Delta_i W_{j,i}\ \partial_{aj} / \partial w_{k,j}$ [$a_j = g(in_j)$]

$= -\sum_i \Delta_i W_{j,i}\ g'(in_j) \partial_{injj} / \partial w_{k,j}$

$= -\sum_i \Delta_i W_{j,i}\ g'(in_j)\ \partial / \partial w_{k,j} (\sum W_k', {}_j a_k')$

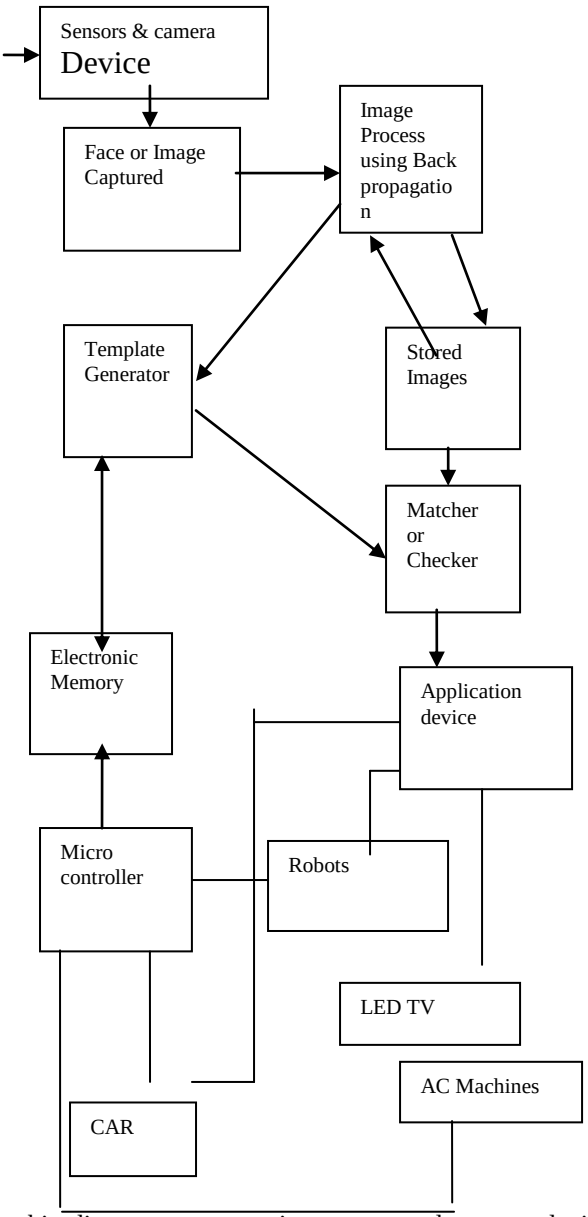
$= -\sum_i \Delta i\ w_{j,,I}\ g'(in_j) a_k$

$= -a_k \Delta_j$ (updating rule for other layers)

In these equations we are updating the weights and rectifying errors which occur in matching clarity images. In this algorithm the neurons and synaptic weights will come into act.

III. PROPOSED SCHEME

Block Diagram of Embedded Systems How It aptures Images and Stored in Microcontroller of Application Devices



In this diagram we are using sensor and camera device inside the Application devices.

once the object has been recognized by the camera using sensor monitor control at minimum range of that device.

This sensor rays has been disturbed by any object the image will be captured. We are using back propagation algorithm if certain image disturbed the sensor rays for first time it will capture the face of that object. If that image or face is disturbing for long time or more than 10sec without moving from that range. Then back propagation algorithm will come into act to check whether the face or image is captured with full dimensions and clarities without any error. If any error occurs the algorithm performs error propagation and updating weights until it match the default dimensions or clarity dimension of that image. In every application device of embedded systems such as led tv, ac, car, robots they are using the micro controllers now a days to perform multiprocessing task of that device. So we just utilizing that resource for another need such as for capturing purpose to run microcontrollers for capturing the images and as well as to run their tasks. In electronic memory we can stored the images of application device is captured.

Performance evaluation:

Step 1: Take an captured image from an sensor device and camera

Step 2: For one time object it is stored in the images this images of the object where it is disturbing the sensor rays that object is captured and it is stored.

Step3: if that object is staying for long time in front of the application device. Which it disturbs. Then back propagates come into act.

Step4: This algorithm checks for correctness and clarity of image with an old image or existed image is stored in device.
That image is default or trained to get or to show clarity.

Step5: if image is matching with default dimensions given by device then algorithm will not come into act. but if it is not matched. Then back propagation will starts until it finds the clarity or default dimensions.

Step6: matcher which it is matches the image with existed one and new one. Where already built by manufacturer.

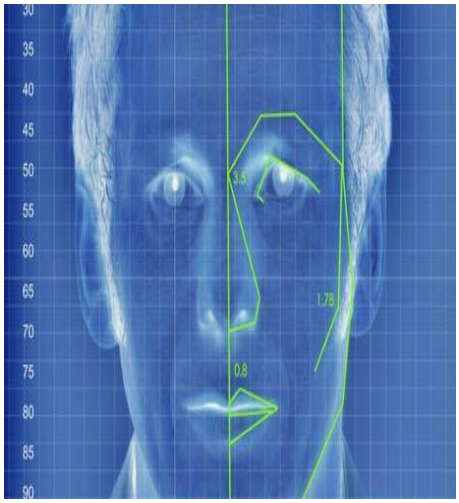
Step7: after retrieving the clarity image then it stores into the electronic memory. When your embedded systems are running mode or idle mode.

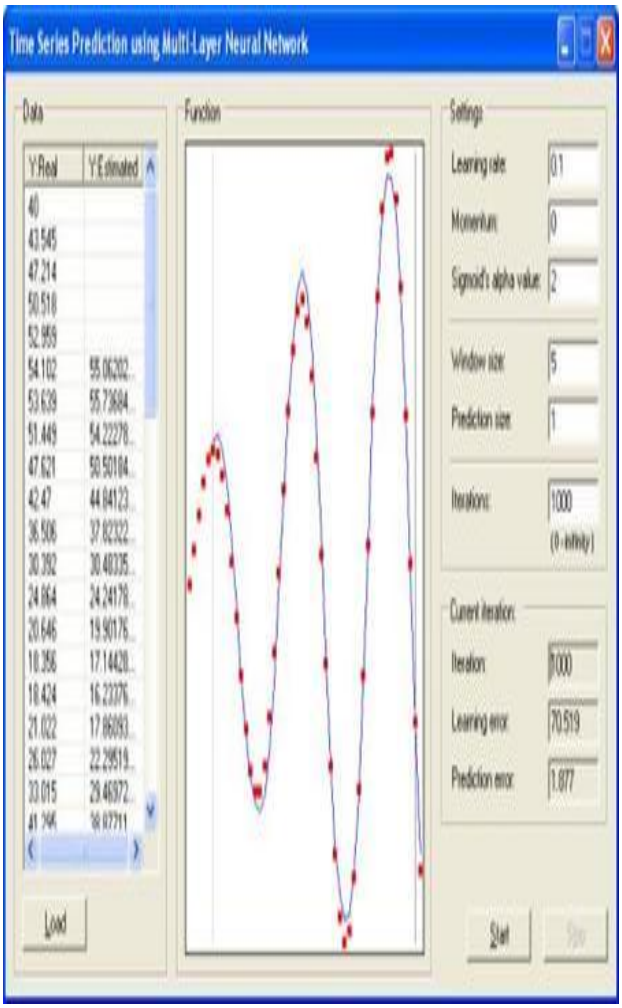
Step8: this transferred will be done by microcontroller to electronic memory.

IV. TESTING AND RESULTS

Statistical summary of results

To test the proposed solution the face of body has taken from image recognizing device and then store it in a device memory without matching and recognized directly. If that face of body or object has stayed long time in minimum range by disturbing the sensor rays of that application device. Then above operation will take place.





V. CONCLUSION

There are more drawbacks in this research idea. But actually trying to show that improve the security systems in public places and use more embedded systems for security purpose. Because everywhere in the world without embedded system are using. So that's why I got an research idea why we cannot implement in embedded systems where we are using in public places. In public places we are preferring cctv separately to monitor.

if any crime attacks takes place these embedded systems come into act with more evidences comparing to cctv which it helps to cops. The major drawback is it is connected to network and not maintaining any large storage database.

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