Abstract

My thesis examines the context in which neural networks. What to include topics such as neural networks, why neural networks, what is included, what is the use and how does it work. We have a world of information and knowledge in the field of networking.
Among the results of this paper can be valuable in understanding neural networks and how they work, an introduction to basic and more familiar with this new knowledge. Today neural networks in different applications such as pattern recognition problems, are used to control and classification problems. Alternatively, control systems in modeling the internal structures are unknown or very complex neural network will learn to control their function. Currently, there are many different types of artificial neural networks, which are summarized as: multilayer perceptron networks, kohonen, Hopfield... The network also faces their own ways, Including a discussion of the applications of pattern recognition, image processing and view, artificial intelligence, control, robotics and many others named. In my thesis, I introduce the issues of artificial neural networks and its applications, and then introduce perceptrons, one of the most important algorithms for artificial neural networks, as well as about learning and practicing and a short description about my experiment result.

Face detection involves separating image windows into two classes; one containing faces (targets), and one containing the background (clutter). It is difficult because although commonalities exist between faces, they can vary considerably in terms of age, skin color and facial expression. The problem is further complicated by differing lighting conditions, image qualities and geometries, as well as the possibility of partial occlusion and disguise. An

ideal face detector would therefore be able to detect the presence of any face under any set of lighting conditions, upon any background.

The most critical part of this system is the algorithm for classifying window patterns. Input windows are masked to eliminate near boundary pixels, which are likely to fall outside the spatial boundary of a face. A best-fit brightness plane is subtracted from the image, and histogram equalization is performed to correct for variations in illumination brightness and camera response curves. The model with which image windows are compared consists of a set of 12 prototypes, constructed by performing a modified version of the k-means clustering algorithm on a representative set of face images and non face images independently. When a new image is presented to the detector, a set of measurements such that each set of measurements is a vector of 12 distances from the new window pattern to each of the window pattern prototypes.

Images presented to the network go through a pre-processing step to improve the classification of the system. An attempt is made to equalize the intensity values of the pixels present in the examination window and histogram equalization is performed to expand the range of intensities, in order to compensate for differences in lighting and camera input gains. The image is passed through a neural network, consisting of a layer of hidden units: four looking at 10x10 pixel sub regions, sixteen looking at 5x5 pixel sub regions (for detecting the eyes and nose), and six looking at overlapping 20x5 horizontal strips of pixels (for detecting the mouth). The output of the network is a single real value, indicating the presence of a face. The network is training with both faces and non faces example images, such that it can learn to classify images in the relevant class correctly.

Learning and practicing

Decision functions can be produced in a variety of ways. When the previous knowledge about the patterns must be detected, available, the decision function based on this information may be carefully determined to be when there is only qualitative knowledge of patterns, the underlying assumptions of a decision-form it can be. In this case, the decision ranges may go away from the correct answer. General situation about the prior knowledge is a bit about the patterns that are detected. In this case the car diagnostics will have a better design using, learning or training practice. In the form of primary, the functions of the decision are assumed to be temporary, and through a sequence of repetitive exercises, these function's decisions are made towards optimal and satisfactory forms.

It's important to keep in mind that exercising and learning only during the design phase of the pattern recognition system it'll be done. When the acceptable results were obtained with a set of training patterns, the system for their actual task is to be applied to environmental samples. Quality of diagnosis extensively by the similarity of training patterns and real data that the system faces during operation will be determined.

Learning the Neural Networks

Neural networks are able to learn from the examples provided. In neural networks, the process learning is the adjustment of communication weights between neurons. From another point of view, the learning process may be a type of search is to be interpreted to find the minimum value of the network error function. There are two approaches to this issue: it is supervised learning (learning with the teacher).The learning step, for each learning sample, is the input and output of each input.

Therefore, we have a number of training pairs (input and output vectors may be respectively to be seen.) These pairs are repeatedly passed through the network, and "correct answers" and "questions" are used in each repetition of learning algorithms, and weights are adjusted so that the network can give a correct answer.
The second is the uncontrolled learning approach. This learning form only needs an input vector typically; a sort of classification is based on the distance (such as the Hamming distance) of an input vector with vectors which the other inputs do. However, the results of this type of learning should be analyzed because of the classification, and it may be incorrect.

Experiment results on photos

Another sample of the photos that were tested, the photo collection was a student whose number was 100 photos samples were selected. Between

those, there are 50 photos were selected for training. The samples of facial skin color of the people present the photos that selected, and Non-skin samples are chosen from the background of the photos they came. Regarding the presence and observation of some samples of skin color in non-skin objects in the color space cbcr, the colors of the skin and non-skin are overlapping. Especially this overlap in the border region of two classes of skin and Unconventional in the color space above makes it a distinction of the two classes face the problem because the distance between the two classes in boundary areas around the class of skin at different points of the size it was not enough, or in other words, in the border region, there were two kinds of classes, there is ambiguity in identifying and separating these two classes. To differentiate between two classes of skin and non-skins, and to eliminate ambiguity in the boundaries of these two regions, above, a special algorithm is needed. The following algorithm was used:

At first, points of the skin class with a certain distance from the delete the unassembled class points and then do the identical for an uncontrolled class; the same threshold was used. So that points of non-skinned class with distance removed specific thresholds from the remaining points of the skin class they came from. Examples of Selected Reports Face Detection in them through the trained network, it has been done, the background problem of an image for those that have a fairly large skin color, there is continuous. This is a problem in some cases it even deforms the geometric shape and shape of the face are. To solve this problem need to consider the features it seems more necessary.

Different sources were prepared, and the following results were obtained:
In frames taken from a digital camera, due to the simplicity of the image field,

a good result is achieved with a network of (2-6-4-1), it was concluded that due to the low number of network parameters, it's easy to detect faces on the network use in movies, this way can be used in face detection applications. In Second test, the network was photographed with a student photo database. Due to the complexity and diversity of the photos, in the achieved network, the result has more neurons in the hidden layers, which is the best network with the structure of (2-90-60-1). The results obtained for the optimal network were acceptable but in pictures that have a dermatological background, it's relatively high and interconnected, this is possible to having trouble, especially in those parts of the field with the exposed skin part of the human face forms one of the interconnected regions gives rise to deformation of the geometric and structure of the revealed part of the human face.

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