

using different training sets. A neural network model was proposed in this article because psychologists not able to analyze the existing large size information and make a high accuracy rate.

2 - Dataset

Dataset used in this research was prepared based on the completed Questionnaires by students of Islamic Azad University of Andimeshk, Iran [3]. Spss was used as statistical software to analyze the questionnaires and to convert them into the numerical data. This dataset includes 354 samples while each sample has 58 features. Dataset includes three different classes according to the level of happiness: low level with 51 data, samples with medium level 35 data and samples with high level 268 data. 10 percent of the total dataset was used as the testing set in this research.

3- Method MLP

Nodes in the feed forward Neural Networks are placed in successive layers. Their relationship is one-way. When an input pattern is applied to the network, the first layer computes it then the result is delivered to the next layer. Each node can transmit signals to the nodes of the next layer. A feed forward neural network is one of the artificial neural networks. It has many applications to solve the complicated problems in real life. In this paper, three-layer feed forward neural network has been selected. The details of the proposed model is shown in Figure 1 [4].

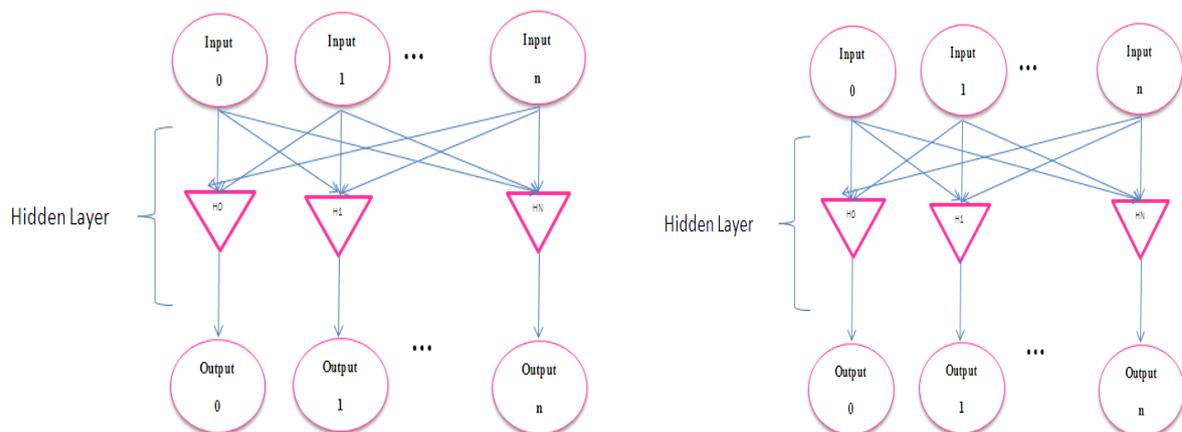


Fig 1. Multi-layer Perceptron Neural Network

Multi layer Perceptron networks are a part of the proposed network. These networks have three layers called input layer, hidden layer (middle), and output layer without limitation of the number of hidden layers. In the network, neurons in each layer send signals to the next layer. Nodes are linked to each other by the connections which have its own changeable weights. Nodes are arranged in parallel layers while the nodes in each layer are connected

only to nodes on two sides. The first layer is the input layer and the last layer is called the output layer. The middle layer is called the hidden layer. Each neuron or node has a processing role. In this process each layer receives the information from the previous layer. Then, the processed data as a result send to the next layer. In this process all nodes work in a same time therefore, there is a parallel processing system in the neural networks. When an input vector is supplied to the input layer, nodes in the input layer receive it but send it to the first hidden layer without any processing. In this layer, information processing is performed on the nodes then the results are sent to the nodes of the next layer. This process is repeated until the results of the nodes of the final layer are sent out as an output vector. Therefore, this type of network is called Forward Networks. Total process which is carried out in the network can be very complicated, but the parallel processing in the different layers of the network decrease the processing complication. Generally a neuron has more than one entry.

4 -The proposed Methods

Hybrid classifications include a combination of multiple classifications. Final result is determined based on the results of the different classifications [5]. The proposed method was formed based on a combination of experts' idea. In this system a classification including of 4 blocks of experts was created based on a neural network MLP. This structure includes three phases: 1- reducing of dimensions and preparing the training sets, 2-training the decision making experts and 3- the combination of results.

4-1 –Size reduction and training sets preparation

As a classifier is not able to recognize all patterns a combination of classifiers is used. We try to create the experts which have a minor error in the recognition while each expert has a different error with others to cover each other's errors. Therefore, if the first classification detect low-and middle happiness accurately but has an error for detecting high happiness, the second classifier should compensate the error of the first classification. In this method each based classifier was trained to only detect of happiness in two levels. The based classification method was trained to get a certain level of happiness. To train the experts, two classes separately should be used for an expert while there were three different classes. Therefore after training, an expert able to identify this two classes. Dimensions reduction is due to decrease the additional computations for the next analysis as well as increase the performance of the classification. Relief with using feature selection algorithm was set in a form which includes all the features with at least 5 percent performance in the pattern recognition. After applying this algorithm seven features were removed due to low participation rates in patterns detection as well as minimizing the processing time from whole model. Total number of input neurons of decision making network is 58 neurons. Neural networks may forget the trained information if there is a similarity in the neural network input information. Therefore, the based classifiers are trained in special subjects. To train the experts, two classes separately should be used for an expert while there were three different classes in the datasets. Therefore after training, an expert able to identify this two classes.

Table 1 : Classes names

| Expert | Class | Class name |
|--------|-------|--------------------------|
| 1 | 1,2 | Happiness low and medium |
| 2 | 1,3 | Happiness low and high |
| 3 | 2,3 | Happy medium and high |

4-2 –Training decision making experts

Matlab environment was used for designing and implementing expert networks. In this model, input vector is used to compute the network output and compare with the its corresponding (classes corresponding to each set) vector. Difference between the achieved output and the accurate output is called error. Therefore, it is returned back in throughout of the network. Next, the weights are tuned according to the Reduction Gradient algorithm for the purpose of error reduction. Training samples are used to find the errors and adjust the weights with acceptable errors.

After the training process, total dataset is used to test the trained network. As a result, each network able to identify the levels of the happiness which is trained for that level.

4-3 - Combining the results

In the hybrid classifications high dimension feature vectors divide to the small size feature vectors. Small size feature vectors are processed in a parallel condition. Final classification result is achieved based on the combination of the results [6]. After the training process, a new data applied simultaneously into the inputs expert networks. At this step the results of various experts with relevant expertise will be achieved. If the results of several experts would be valid, the majority voting is used. Otherwise, the result achieved from the fourth expert which includes all dataset as the input vector is accepted. This expert is able to recognize three classes. For example if expert 2 and 1 Reply 1, expert3 and 2 Reply 2 and expert 3 and 1 Reply-3, therefore there is not a majority vote. In this condition the final answer of the network is according to the fourth expert results.

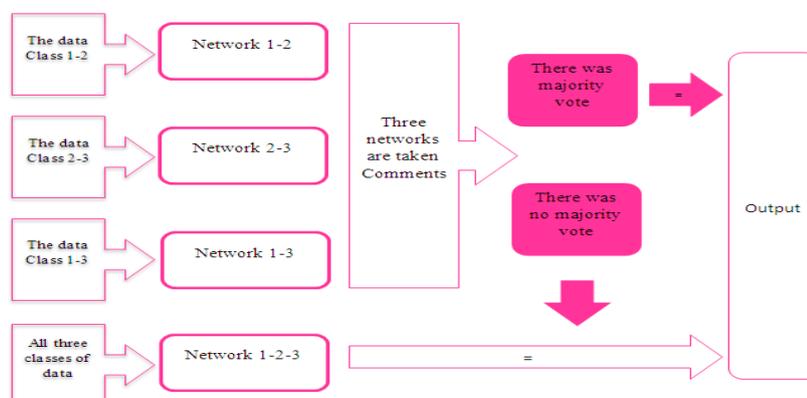


Fig 2.The Proposed method

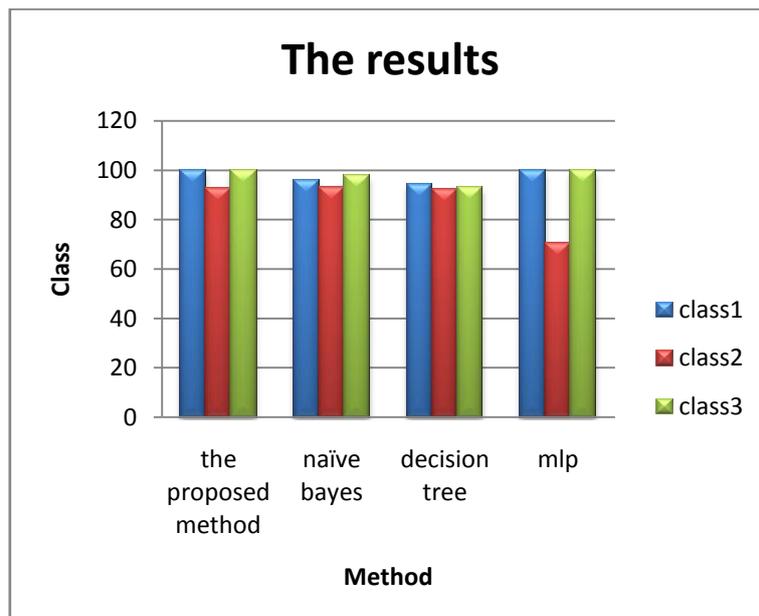
5 –Results and conclusion

One of the strengths of the proposed method is high accuracy rate of recognition in the level of happiness with small size of training data. The reason is due to the expertise of each expert.

In the proposed model every expert only is trained with the data in two-classes. Therefore, it can recognize the correct result while there is a small size of data in the training set. The proposed method has a good performance due to the variation of errors. Moreover, experts able to cover weaknesses of the each other to find the better results. The proposed method in this research showed an average Accuracy of 97% which is compared with other techniques such as Multilayer Perceptron, Decision Tree and Naive Bayes. The comparison results are shown in Table 2. According to Table 2, the proposed method shows the better performance in comparison with others.

Table 2 :The results

| Average Accuracy | Method |
|------------------|----------------------------|
| %97.3 | The Proposed method |
| %90.6 | Multilayer Perceptron |
| %92.7 | Decision Tree |
| %94.4 | Naive Bayes |



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