Name of the Scholar: Rahul vivek purohit
Name of the Supervisor: Dr. S. Akhtar Imam
Name of Co-Supervisor: Prof. M. R. Khan
Department of Electronics and Communication Engineering
Title of the Thesis: Some Investigations into the Performance various pattern recognition techniques used in sensors

ABSTRACT

Pattern recognition is concerned with the automatic detection or classification of objects or events. Most pattern recognition tasks are first done by human beings and automated later. Automating the classification of objects using the features as those used by people can be a very difficult task. The applications of emotion recognition in consumer electronics are increasing day by day. However the accuracy and stability of the decisions made by appliances largely depends on the efficient recognition of these emotions. The performance may degrade drastically due to interfering noise.

This thesis proposes a method which may improve the accuracy significantly. Results have confirmed that this system may help to improve the recognition results. This thesis has used gender as demographic information to achieve better accuracy.

Since the emotions are not only affects by the environment but also by the gender of the individual, this thesis has proposed a two level system which can help improving the recognition results. It has been shown that in noisy environment it is difficult to differentiate between the male anger and female neutral voices; hence gender

recognition coupled with speech recognition can improve the accuracy considerably. The results show that the emotion recognition accuracy is improved by 30% by combining gender with speech recognition. There is still some miss-classification error in the first stage due to remaining cross over ranges of pitch mean which may further improve the results.

This thesis also investigates the performance of various classifiers for a set of given features. With the help of three level emotion recognition system, it has been concluded that not a single classifier cannot provide best accuracy of each emotions, rather different classifiers provides different accuracies for different emotions. However it has been found that the fisher + SVM may be considered as optimum combination.

A three-level speech emotion recognition model has been investigated to classify six speech emotions, including sadness, anger, surprise, fear, happiness and disgust. For each level, appropriate features are selected by using Fisher rate which is also regarded as input parameter for Support Vector Machine (SVM). In order to investigate the performance of the model, principal component analysis (PCA) for dimension reduction and artificial neural network (ANN) for classification are adopted to design four comparative experiments, including Fisher + SVM, PCA + SVM, Fisher + ANN, PCA + ANN. The experimental results proved that Fisher is better than PCA for dimension reduction, and SVM is more expansible than ANN for speaker independent speech emotion recognition. The average recognition rates for each level are 86.5%, 68.5% and 50.2% respectively.