

Introduction

5.1 Recognition Accuracy

Conclusion

Introduction

There is a lack of standard dataset for Bangla OCR. Therefore we have used the dataset which is collected from [20]. For experimental purpose, 200 images for each character and numeral as a total of 12,000 images have been used. The implementation of the system has been carried out using Matlab R2017a. The results have been computed using a 5 fold cross-validation technique. In a five-fold cross-validation scheme, the entire dataset has been divided into five subsets. During each fold, one of the subsets has been used for testing the classifier and the rest have been used for training. The final accuracy of the classifier is obtained by calculating the average of recognition rates from the test set in each fold.

5.1 Recognition Accuracy

Like the title of the thesis portrays, both Histogram of Oriented Gradients and Gabor feature vectors are fed to ELM classifier to evaluate individual recognition accuracy rate. Then these two feature vectors are fused together by concatenation producing a more substantial set of feature vector which gives higher recognition accuracy as expected. The experimental results are shown in the following tables.

Table 5.1: Comparison of Performances of Different Feature Extraction Techniques.

Feature Extraction Technique	Total Input Data	Correctly Identified Data	Accuracy (%)
Histogram of Oriented Gradients	12000	10860	90.5
Gabor filter	12000	10944	91.2
Combined	12000	11532	96.1

Table 5.1 summarizes the overall accuracy of the system with each of the three feature sets.

Table 5.2: Recognition Rate of Feature Extraction Techniques.

Input Character	No. of input sample	No. of Correct identification			Accuracy (%)		
		<i>HOG</i>	<i>Gabor</i>	<i>Hybrid</i>	<i>HOG</i>	<i>Gabor</i>	<i>Hybrid</i>
অ	200	180	182	192	90	91	96
আ	200	179	183	191	89.5	91.5	95.5
ই	200	181	181	193	90.5	90.5	96.5
ঈ	200	180	182	194	90	91	97
এ	200	180	183	192	90	91.5	96
ক	200	181	181	191	90.5	90.5	95.5
খ	200	180	183	192	90	91.5	96
গ	200	180	183	191	90	91.5	95.5
ম	200	181	182	193	90.5	91	96.5
ল	200	182	181	193	91	90.5	96.5
ত	200	181	181	194	90.5	90.5	97
ভ	200	182	182	193	91	91	96.5
দ	200	180	183	191	90	91.5	95.5
১	200	181	182	191	90.5	91	95.5
৩	200	181	184	191	90.5	92	95.5
৬	200	181	182	190	90.5	91	95
৭	200	181	184	191	90.5	92	95.5
৯	200	180	181	192	90	90.5	96

Table 5.2 represents recognition no. of some characters. It clearly shows that feature fusion approach correctly identifies more samples for each character than individual feature extraction technique. A graphical representation of the recognition results is also shown in Fig. 5.1

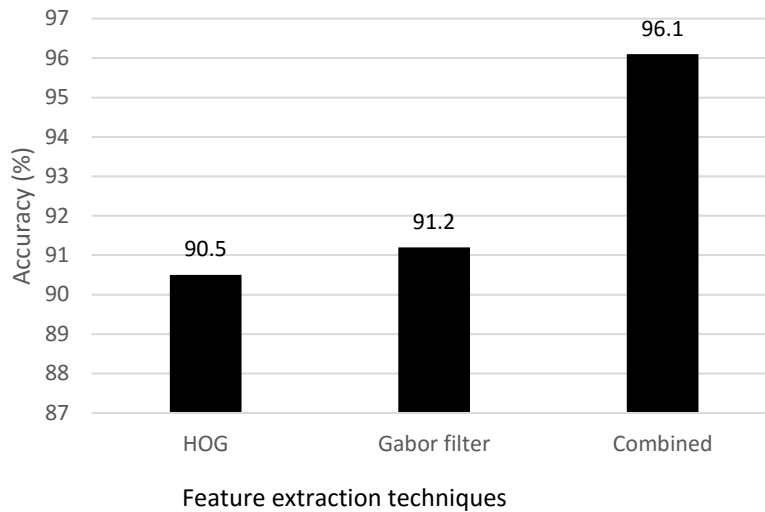


Fig. 5.1: Accuracy rates of different feature extraction techniques.

Fig. 5.1 demonstrates the best recognition rate of 96.1% for fused features. The next highest accuracy has been gained for Gabor filter (91.2%). HOG based features provide comparatively low recognition accuracy of 90.5%.

Conclusion

We have obtained the best recognition accuracy of 96.1 % using feature fusion feature vectors. This accuracy can be further improved by using a larger dataset for training. Also post processing approaches for identifying similar shaped characters can further improve the recognition rate.