from a different point or traverses in a different direction. Consistency is required in order to minimize variations in chain-codes of the same character. The image is traversed using the connected component analysis algorithm. It then performs a traversal of the skeleton, segmenting it into strokes separated by points that have one or more than two neighbors (since these points are either endpoints or junctions where different strokes meet)obtain the chain code features.

Algorithm to obtain chain coding with 8-neighborhood is as follows:

Step 1: Firstly find out the non zero values in the starting point of the character and store that.

Step 2: secondly assign 0-7 total of eight directions to character.

Step 3: Then travel along all the 8-neighbors.

Step 4: Add this in to list of the chain code.

Step 5: Then Move on to next position one by one.

Step 6: Check whether we have reached first point or not if not then repeat the 3rd step.

A simple example of chain code extraction for one character is being shown in the Figure 4

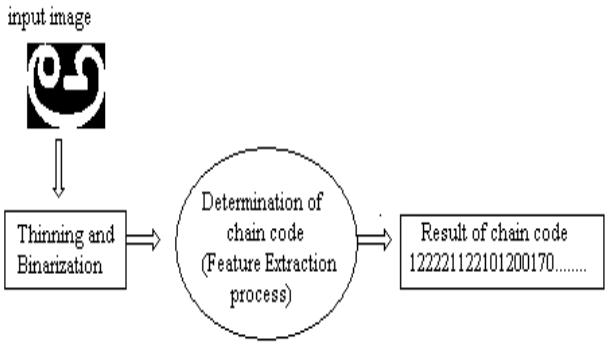

Figure 4: Chain code extraction method

2.4 Classification

A brief of the classification phase would be required to give a more meaningful account of the work mentioned in this paper. The classification phase of the system is based on the concept of classification rules developed using Mat lab (Version 7.4.0). The feature values are passed to KNN classifier once and then to SVM classifier next which generates the different set of groups which will get classified into different classes with the accurate correct rae and error rate is being displayed. The different groups provide the classified class. The classified class provides the detected character. The detected single characters can be again combined in the KNN classifier into continuous form as initial test sample but in the SVM classifier it is not possible to combine more than two characters because it is a binary classifier. In SVM there is a chance of miss classification of the characters with error rate but in KNN the error rate is absolutely zero and no miss classification of characters will occur. Finally the plot of correct rate and error rate for KNN and SVM are plotted. By looking this plot one can say which classifier works well for this application. Correct rate is 100% for KNN that is all the characters are correctly classified without misclassification.

3. Experimental Results

In this paper initially the training Kannada vowels are obtained from different peoples because different people will write the Kannada characters in different font style. Some of the writings are easily understood by everyone and some writings are very difficult to understand hence data is collected from various people. They are written in paint tool and saved as bitmap images. On these bitmap images pre-processing, segmentation and free man chain coding is computed to extract the chain code features. These chain code features are implemented in the MATLAB environment. The chain code features are then normalized and used to train the KNN classifier and SVM classifier separately. The accuracy obtained for KNN is 100% with error rate of 0% and all the characters are correctly classified and corresponding vowels are displayed. But in SVM over all accuracy is 92.56% correct rate and error rate is 7.44% is obtained due to this error rate misclassification of characters will occur is as shown in figures.

Figure 5: GUI developed for comparison of KNN and SVM for 5 Kannada vowels

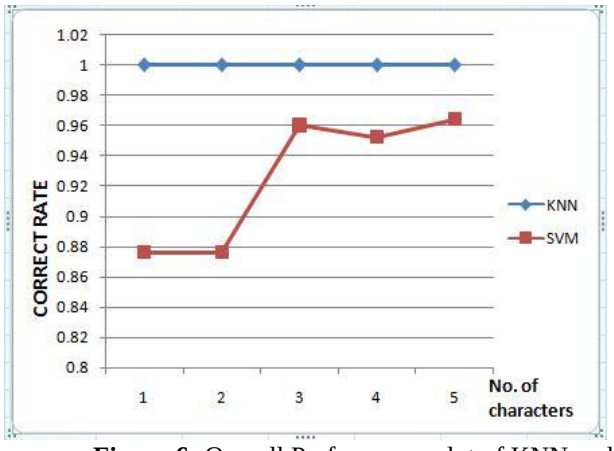

Figure 6: Overall Performance plot of KNN and SVM for correct rate

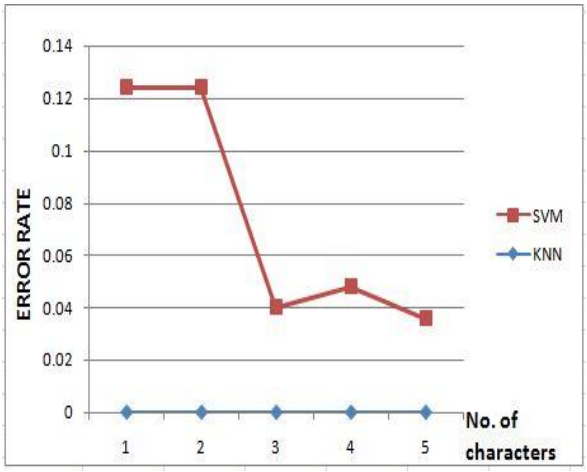

Figure 7: Overall Performance plot of KNN and SVM for error rate

Table 1: Shows the correct rate and error rates of KNN and SVM for the corresponding Kannada vowels

5 CHARACTERS	KNN		SVM	
	CORRECT RATE	ERROR RATE	CORRECT RATE	ERROR RATE
1)	100%	0%	87.6%	12.4%
2)	100%	0%	87.6%	12.4%
3)	100%	0%	96%	4%
4)	100%	0%	95.2%	4.8%
5)	100%	0%	96.4%	3.6%

4. Conclusion

An efficient and simple Handwritten Kannada vowels recognition system for performance comparison of KNN and SVM classifiers are investigated in this project. Here a new method of feature extraction algorithm is used i.e. chain coding technique. The most important part is the selection of feature extraction method which will increases the recognition accuracies like correct rate and error rate. With the use of this method the KNN and SVM are trained separately in the training phase and in the test phase the test characters are tested one by one in KNN and SVM and the corresponding correct rates and error rates are obtained. Over all the KNN classifies well than the SVM and can achieve 100% correct rate and 0% error rate for all the characters tested in KNN classifier but Characters tested with SVM classifiers will give over all correct rate of 92.56% and 7.44% error rate. The performance plot for correct and error rates of KNN and SVM are plotted as correct rate versus no of characters and error rate versus no of characters. This method will find application in postal address recognition, mail sorting, banking, historical documents conversion to machine editable format, medical etc.

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