Project Proposal

Handwritten Hindi Numerals Recognition

Submitted by:
Akarshan Sarkar
Kritika Singh

Motivation

Currently, a large amount of documentation in Hindi is paper-based and needs to be digitized to make it easily accessible. Manually entering this data into computers demands a great deal of time and money and automating this process can prove very useful. This can be done using Hindi character recognition. A Hindi digit recognition system can also be used for the automatic conversion of hindi numerals as they are written on a digitizer or Personal Digital Assistant(PDA) and can be utilized in making something like a touch screen hindi calculator.

Related Work

Many approaches to solving the problem of digit recognition exist today which can be broadly categorized into: a)Feature extraction methods and b)Classification methods. Feature extraction methods can prove very advantageous in achieving high recognition performance once a discriminative feature set is obtained. The classification methods include the K-Nearest Neighbor method, Bayesian classifier, Polynomial Discriminant Classifier, Hidden Markov Model, Support Vector Machine and Neural Networks. The most promising results have been obtained with Neural Networks of which the most widely used is Multi-Layer Perceptron (Bishop, 1995). All these techniques have their advantages and disadvantages and many of these have been combined to get better classification results.

Our Approach

Our approach in this project will be first to create the training set of handwritten hindi numerals in a suitable format which will require scanning, bounding, segmentation and normalization of the collected numerals. Further, successive applications of the Wavelet filter(Daubechies wavelet filter) on these normalized images and their smooth components obtained gives a

set of image components which vary from fine to coarse resolution levels. The features used for classification will be histograms obtained from the components of wavelet-filtered images.
The classification technique that we will be using for classification of these features will be Multi-Layer Perceptron Neural Networks(distinct at different resolution levels) starting from lowest resolution level and taking it to higher levels then in case of rejection(rejection criteria for each level is set by minimizing misclassifications on the basis of validation sets). If an input sample gets rejected at each of the resolutions, their outputs are concatenated and form input of a final MLP . Backpropagation (BP) algorithm will be used for training these MLP classifiers.
We will keep aside a subset of training samples for validation and use remaining for BP training which will continue until the recognition performance on the validation set is improved. When our neural network is trained giving optimum results on validation sets, we will test our network reporting accuracy and the deviations.
Also if time permits we would like to approach using SVM and compare the results.

Bibliography

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