Result Section:

The method of recognition of digits involves refraction of light rays from two different kinds of sources, one is point source of light and another one is parallel beam of light. All parameters have been kept fixed for the second method , including the length of feature vector and input image size. But, for the first one, two lengths of feature vector have been taken and input image size is varied for the both to get optimal length of feature vector corresponding to its input image size. For classification in both cases, each dataset is divided into two parts, viz. train set and test set, the ratios being 7:3, 4:1 and 3:1.

Square images of two sizes are taken as input, one with length = 32 and another with 64. For both cases, the another parameters which are involved in the method involving refraction of light rays from point source, are depth of the air medium, d = 2/3 times of the length of the input image, the refractive index of medium upto d = 1, the refractive index of medium placed below that = 2 and the refractive index of the medium that forms the digit = 3. This test has been conducted on online dataset of Assamese and Devnagari and offline dataset of CMATER of Hindi, Bengali, Arabic and Telegu. The accuracies, obtained by conducting this test, has been recorded in table and is shown in fig. - 1 and fig. - 2 given below.
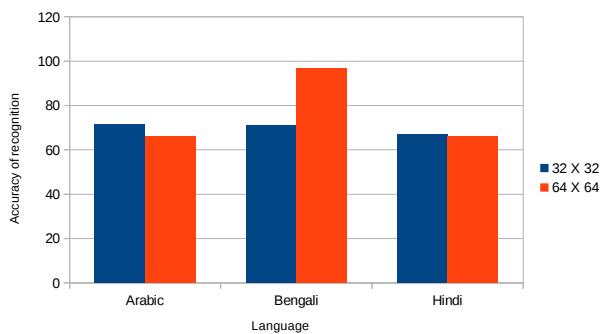

Fig.1 : Accuracy of recognition v/s Language bar chart for input images of two sizes with feature vector length = 76
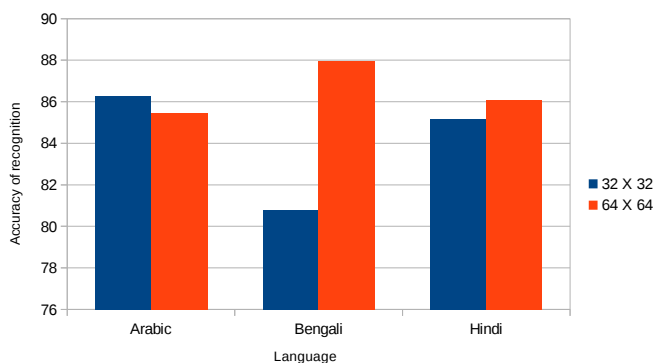

Fig.2 : Accuracy of recognition v/s Language bar chart for input images of two sizes with feature vector length = 323

The length of feature vectors are taken as 76 and 323 for one method and 768 for the second one. The length of feature vector has been varied based on number of sorces of light placed in the image. The chart given below shows the variation in accuracy of recognition(%) due to change in length of feature vector.

In fig.1, the input image size of 32 X 32 is giving better result, but in fig.2 64 X 64 input image size is giving better result and that too surpasses the highest result for each language by 10% – 15% acuuracy of

recognition. So, based on both the figures, the optimal feature vector length is 323 with optimal input image size being 64 X 64.

Now, the optimal feature vector has been merged with the second feature vector to make a unique feature vector, whose length is 1172 and then, Random Forests are applied on the feature vectors. Random Forests are an ensemble learning method for classification and regression and other tasks. Random forests are a way of averaging multiple deep decision trees, trained on different parts of the same training set, with the goal of reducing the variance. This comes at the expense of a small increase in the bias and some loss of interpretability, but generally greatly boosts the performance in the final model. Applying this, the obtained accuracy is charted below in fig.3.
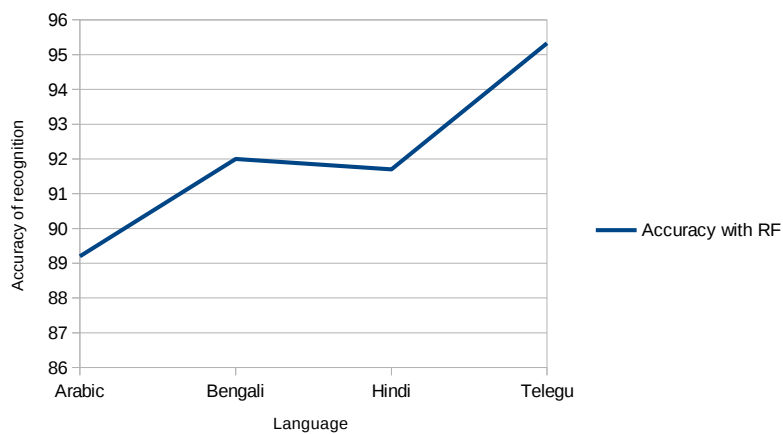

Fig.3 – Line Chart to show accuracy of recognition v/s language after applying RF