

CAPSTONE PROJECT PROPOSAL

By: Rahul Passi

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Machine Learning Advanced Nanodegree

Devanagiri character (HINDI) Recognition using Deep Learning techniques

Domain background

-Character Recognition

Character recognition is the ability of a computer to interpret intelligible characters from sources such as paper documents, photographs, touch-screens and other devices. The image of the text may be sensed "off line" from a piece of paper by optical scanning (optical character recognition) or intelligent word recognition.

Character Recognition plays an important role in storage and retrieval of typed and handwritten information. A wealth of historical papers and archives exist in a physical format. This includes genealogical information, old research papers, letters to and from important people in history, old family records, written manuscripts, personal diaries and many other important historical data. Consistent review of this information damages the original paper and can lead to physical data corruption.

Character recognition allows people to translate this information into easily readable electronic formats. Modern technology has allowed us to recognize characters from images. The new prediction algorithms of machine learning and artificial intelligence have allowed us useful and trustable methods of character recognition. This has extended from predicting words to predicting entire sentences, all the way to predicting entire letters. This also has allowed new breakthroughs in language translation. Now, predicting characters from different languages is getting easier day by day with advancement in machine learning field and predictive algorithms.

Problem Statement

The goal is to predict the digit ' Devanagari characters' (Hindi) in an image This is a deep learning problem – more specifically an image classification problem.

There are various models for classification of characters of English and other languages but there are comparatively less for classification of Hindi characters.

The model should be able to classify which Devanagari character is in the image, with high accuracy.

Datasets and Inputs

The dataset of characters is taken from Kaggle . It comprises of about 92000 images in a total of 46 sub-directories corresponding to 46 characters including digits and consonants but excluding vowels. Each image is of 32x32.

Also a csv file containing pixel information of the characters it is of dimension 92000*1025. There are 1024 input features of pixel values in grayscale (0 to 255). The column "character" represents the Devanagari Character Name corresponding to each image.

#Acknowledgement- This dataset was originally created by Computer Vision Research Group, Nepal.

Solution Statement

As character recognition is a subdomain of image classification, I plan to use deep learning methods in order to classify the different devanagari characters.

Deep learning models are effective at determining the different and important features of a given image. I plan on using the convolutional neural network or short for CNN. CNN is a very useful and highly effective deep learning algorithm for classification in images.

Benchmark Model

The benchmark model is chosen from one of the kernels of the Kaggle Devanagari character recognition.

The benchmark models have an accuracy around and above 90% .Aim would be to match it and get a score of over 90% accuracy.

Evaluation Metrics

The trained CNN model will be tested for accuracy. This accuracy will be compared with the benchmark models.

Accuracy is measured as ratio between correctly predicted dataset and and tested dataset. Higher the accuracy, better the model.

Project Design

First, the information stored in CSV files (discussed in dataset and inputs section above) is loaded into python using panda library. The data will be first explored and visualized using numpy and matplotlib library .Data is normalized. Then, a CNN (Convolutional neural network) is built. The built model will be trained and then tested for accuracy. The accuracy will compared and matched against benchmark models and accuracy of above 90% will be considered a success. Model would be refined to improve accuracy , if possible.