Documentation(Tushar Gurjar)- Image Analysis Pclub Self Project

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1 Introduction

The main objective of the project Image Analysis is to analyse a image and extract features of the image.
Image Analyser basically gives you the text in the image. The text can be located at any position in the image. Our algorithm supports large range of computer fonts and successfully retrieves it from the image.
The text obtained from our Image Analyser can be used in number of other purposes.

2 Implementation Details

Our project is based on the following architecture .

Text Regions Detection

Our image Analyser uses MSER (Maximally Stable Extremal Regions) for text detection in the image. It gives us with text regions but also some non text regions which can be filtered later.

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Word Formation

Different text regions which were detected by MSER are grouped into words using geometrical constraints. This gives us the words in the image.

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Character Segmentation

In different word regions we find connected components which gives us all individual character regions in the word.

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Character Recognition

In this final step the character is recognised using convolutional neural network.

3 Week1:20-5-17

1. Learned python by LPTHW and Codeacadamy. All sample files that were used for learning python are added to the github repositories.
2. Learned git from Codeacedemy.
3. Learned important python libraries that will be used in project -Numpy, Scipy, Pickle and MatplotLib from http://cs231n.github.io/python-numpy-tutorial/ and other resources.
4. Started with Andrew Ng course and completed 3 weeks. Done with linear regression, logistic regression. from https://www.coursera.org/learn/machine-learning/home/welcome

4 Week2:

1. Continued Machine Learning from Coursera and completed till week 7.
2. Done with concept of Neural Networks and SVM.

5 Week3:

1. Studied TensorFlow library for implementation of the above mentioned machine learning techniques from https://www.tensorflow.org/tutorials/
2. Start working on letter classification using logistic regression (will implement using neural network for improving accuracy).
3. Wrote code for A-J letter classification. Working with 86 percent accuracy on test dataset.

*code for letter classification on github repository-
https://github.com/tushargr/PclubProject_ImageAnalysis

6 Week4

1. Explored different techniques for text detection. Figured out best technique for text detection -MSER
2. Wrote a code for MSER implementation using opencv library for text regions detection.
3. Wrote a code for implementing grouping text regions into words based on geometric constraints.

7 Week5

1. Written a code detecting individual character regions for from the detected word regions.
2. Learned Keras from - http://machinelearningmastery.com/tutorial-first-neural-network-python-keras/
3. Implemented a character recognition Neural Network using keras. Used the Char74k EnglishFnt dataset for training the neural network. - http://www.ee.surrey.ac.uk/CVSSP/demos/chars74k/
4. Tested the made neural netowrk on char74k test dataset. Got 88 percent accuracy on the test set.
5. Improved the Neural network by adjusting the hyperparameters.

8 Week6

1. Learned Convolutional Neural Network from - https://adeshpande3.github.io/adeshpande3.github.io/A-Beginner's-Guide-To-Understanding-Convolutional-Neural-Networks/ and other online resources.
2. Took the Keras Convolutional Neural Network tutorial from - https://elitedatascience.com/keras-tutorial-deep-learning-in-python
3. Written code for Convolutional Neural Network using Keras for improving character recognition accuracy.
4. Tested the made Convolutional Neural Network on char74k EnglishFnt test dataset. Got 95 percent accuracy on the test set.