Documentation- 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 Commandine tutorials from Codeacedemy.
3. Learned Git from Codeacademy.
4. 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.
5. 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. Understanding Machine learning idea and its implementation in our problem.
2. Continued Machine Learning from Coursera and completed till week 6 .
3. Done with concept of Neural Networks and its implementation.
4. Studied TensorFlow library for implementation of the above mentioned machine learning techniques from - https://www.tensorflow.org/tutorials/

5 Week3

1. Start working on letter classification using logistic regression (will implement using neural network for improving accuracy).
2. 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. Learned about MSER (maxiimally stable extremal regions).
2. Written a code for MSER implementation using opencv library for text regions detection.
3. Formulated an algorithm for grouping detected text regions into words based on geometric constraints.
4. Written a code for implementing grouping text regions into words.

7 Week5

1. Formulated an algorithm for detecting individual character regions for from the words regions as mentioned above.
2. Learned about Keras for implementation of character recognition system 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.

By now we are done with the basic model which retrives text successfully from the image to a good accuracy.

8 Week6

1. Learned about 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. Implemented the 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.
5. Merged all the code in the single python file.