TEXT EXTRACTION FROM INVARIANT COMPLEX IMAGE

NOURI ALI AL MABROUK AL HASHI

UNIVERSITI TEKNOLOGI MALAYSIA

ABSTRACT

Great progress has been made in Optical Character Recognition (OCR) technology. Most current OCRs, however, can only read characters printed on sheets of paper according to some rigid format restrictions. For that, the detection and extraction of text regions in an image are well known problems in Computer Vision research area. The goal of this project is to extract and recognize the text from an image by using the edge-based and fuzzy logic algorithm respectively. The algorithms are implemented and evaluated by using a set of images of natural scenes that vary along its' size, scale and orientation. Various kernels can be used for this operation ,the whole set of 8 kernels is produced by taking one of kernels and rotating its coefficient circularly and edge-detection operator is calculated by forming matrix centered on pixel chosen as center of matrix area, then Localization involves further enhancing regions by eliminating non-text regions. Edge-detection works quite well for digital image corrupted with multi-scale and multi-orientation whereas its performance of this operator cannot be used in practical image which generally corrupted other types and edge-detection for detection of edge in digital image is that image should contain sharp intensity transition and low noise of the type is present. Moreover the image is colored image .Then, edge detect at eight edges and convolve with Gaussian after that select the strong edge was suitable of detect the text. As known be the project in complex image by using eight kernels to accomplish the task .Then, we used identified pixel of determine the character with use fuzzy logic.

.

ABSTRAK

kemajuan yang pesat telah berkembang dalam teknologi pengenalan wojah optic(OCR). Kebangakkan OCR kini hanga boleh mengenapasti wajah yang dihadkan untuk itu ,pengecanan dan mengeluarkan esbahagian format kawasan danpada imej adalah salah sutu musalah yang masih dibuat kajjan dalan system komputer .Projek ini bertujuan untuk mengeuarkan dan mengenalpasti teks daripada imej menggunakan kaedah teras-sisi dan algoritma logik fuzzy .Algorithma ini telah digunakan dan dinilai menggunakan beberapa set imej yg dan bersifat semulajdi yang berbeza dari segi saiz, skala dan kedudukan. Operator kompas teloh digunakan dimang ia menganchingi lopan isirong yg digunakan untuk mengesun 8 arah berlainon selepasitu,setiap sisi dikumpulkan bersama mengunakan tingkatan sisi menegan. Kaedah ini adalah sangaf penting untuk menentukan cirri pergerakan dan juga perabahun setiap pemanjangan jugu nemberi perubahan juga kepada cirri ketinggian yg berkaltan penempatan juga terlibut untuk mempertingkatkan kawasan dengan menghpuskan kanan bukan teks. Imej ini adalah imej yg bewaran.Kwmudiank sisi akan aikesun mengyunkgn pengesan pada lapan sisi dan menggulung dengan kaedan cuussian selepas sisi yang kuat dipilih bersesuaien dengan pengesan teks sepert yang diketahui imej yang kompleks akan menggunakan lapon isirong untuk mengempumakan tugas ini .Kemudian ,pengesan piksel digunakan untuk mendapatkan cirri yang dikehendaki menggunakon logic fuzzy

.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

1.1 Introduction

During the past years, recent studies in the field of computer vision and pattern recognition showed a great amount of interest in content retrieval from images and videos. This content can be in form of objectives, colors, textures and shapes as well as a relationship between them.

As stated by (Kwang, Keechul and Jin, 2003c) the text data is particularly interesting, because text data can contain image of varying text due to differences in size ,orientation and alignment as well as complex background that make the problem of automatic text extraction extremely challenging. In recent years, great progress has been made in Optical Character Recognition (OCR) technique that can only handle the text against plain monochrome background, and extract text from a complex

background. Commercially, OCR engines cannot yet detect and recognize text embedded in complex background directly.

Extraction of text from images has been relied upon mainly on the properties of text. In the past few years, it was witnessed rapid growth in a number and variety of applications using fuzzy logic. Fuzzy logic is a logical system which is an extension of multi-value logic. It was used to identify the character after extracting text from an image. (Kongqiao and Jari, 2003b) proposed character recognition that comprises a character boundaries operation for invariance of multi-scale and multi-orientation.

Finally, it is expected that results will present the success of text extraction and recognition process from a complex image.

1.2 Problem Background

Most of the applications that involve documented naturals, where texts and graphics are blended together, need some land separation between texts and graphics to detect and recognize text without any computer help is difficult task of information processing field. Because of that, intensive projects are performed to process extraction and recognition by machine and automatic extracting recognition were topics of research for years.

(Jagath and Xiaoqing, 2006b) their algorithm which can use edge-based text extraction algorithm which is robust with respect to font sizes, color, intensity, orientation, effects of illumination, reflection, shadows, perspective distortion and the complexity of image background can quickly and effectively localize and extract text from real scenes.

(Kongqiao and Jari, 2003b) they proposed connected-component based (CC-based) method which combines color clustering, a black adjacency graph (BAG) , an aligning –and-merging-analysis (AMA) scheme and a set of heuristic rules together to detect text in the application of sign recognition such as street indicators and billboards . (Rainer and Axel, 2002c) proposed a feed-forward neural network to localize and segment the text from complex images; it is designed specifically for horizontal text with at least two characters. (Yuzhong, kallekearu and anil, 1995) proposed hybrid of CC-based and texture-based method to extract text. Although experimental results show that the combination of these two methods perform better, the monochrome constraint used also fails to detect touching characters. (Kwang, Keechul and Jin, 2003c) combined a Support Vector Machine (SVM) and continuously adaptive mean shift algorithm (CAMSHIFT) to detect and identify text regions. Datong, (Herve and Jean, 2001) they used a SVM to identify text lines from candidates .However, experimental results show that both methods above are mainly designed for video captions.

(Jiang and Jie, 2000) developed a three layer hierarchical adaptive text detection algorithm for natural scenes; this method has been applied in a prototype Chinese sign translation system which mostly has horizontal and/ or vertical alignment. (Ezaki, Bulacu and Schomaker, 2004) proposed four character extraction methods based on connected components. The performance of the different methods depends on character size. (Takuma, Yasuaki and Minoru, 2003d) proposed digits classification system to recognize telephone number written on signboard. Candidate regions of digits are

extracted from an image through edge extraction, enhancement and labeling. Matsuo, (Ueda and Michio, 2002d) proposed a text extraction algorithm from image scenes after an identification stage of local target area and adaptive thresholding. (Xilin, Jie, Jing and Alex, 2003e) proposed a framework for automatic detection of signs from natural scenes .This framework considers critical challenges in sign extraction and can extract signs robustly under different conditions .

Based on these studies, this project attempts to propose extraction strategy relies on the edge-detection of text and characters in conjunction with fuzzy logic to recognize characters.

1.3 Problem Statement

This study that utilizes effective extraction method may provide significant improvement of multi-orientation and multi-scale recognition performance .To reach good recognition performance, it is important to solve explicit extraction problems such as different scale and different orientation.

The main research question is “how to achieve an effective extraction of text variations for multi-scale, multi-orientation and sub-question of main project questions as shown:

1. How the recent extraction approach has done?
2. How system might improve extraction approach?
3. How to evaluate and to measure the proposed extraction and recognition character performance?

1.4 Project Objectives

Based on the problem statement above, this project encompasses a set of objectives that is associated with milestones of the project process. The project objectives are mentioned below.

1. To develop an improved extraction method based on edge detection and fuzzy logic.
2. To verify the effectiveness of the proposed technique as compared to existing techniques.

1.5 Scope of the Project

In order to accomplish the objective of this study, it is important to identify the scope which covers the following aspects:

This research is concerned with the extraction of text from image and recognition of characters by using fuzzy logic.

1. This research is concerned with invariant complex image.
2. Dilation and erosion are used to remove noise and touching between characters
3. Fuzzy logic that is used for identifying the characters.

1.6 Significance of the Study

This study is carried out with the main objective of extracting text. Based on the results obtained, it is hoped that this is able to achieve the following:

1. To give exposure on another promising technique of extraction that could offer better or at least same performance as the existing techniques.
2. To solve the extraction problem such as complex background, different style, font etc.
3. To encourage more works in exploring the advantages of extraction and recognition.

REFERENCES

Alasdir,2004.Introduction to Digital Image Processing with Mathlab. Springer-Verlag Berlin Heidelberg 2007

Chunmei, Chunheng, Ruwei, (2005).Text Detection in Image Based on Unsupervised Classification of Edge-Based Features.IEEE. 0-7520-5263. Proceedings of the Eight International Conference on Document Analysis and Recognition. china.2005

Chengjie, Jie and Trac, 2002b.Adaptive Runlenght Coding .IEEE.0-7803-7622-6.Baltimore MD 21218

Datong,Herve and Jean, 2001. text identification n complex background using SVM.IEEE.0-7695-1272-0.Dalle molle insitiute for perceptual artificial intelligence,Switzerland .UTM.2001.

Ezaki, Bulacu and Schomaker,(2004).Text Detection from Natural scene Images:T owards a System for Sisually Smpaired Sersons. In Sroceedings of the Snternational Sonference on Sattern Secognition (ICPR'04).pp.683-686.2004.

Fuzzy Logic Toolbox User's Guide" The MathWorks, Inc. 2006f

Gatos, Pratikakis, Kepene and J.perantonis(2005a). Text dectection in indoor/outdoor scene images. Proceedings to National center for scientific research "Demokritos", GR-153 10 Agia Paraskevi, Athens, Greece

Holland JH,(1975) . Adaption in Natural and Artificial systems. University of MICHIGAN press, Ann Arbor, 1975

Hyeran, Seong-Whan, Applications of Support Vector Machines for Pattern Recognition: A Survey, SVM 2002, LNCS 2388, pp. 213-236 , 2002a

Jagath, and Xiaoqing .(2006b). An Edge-Based Text Region Extraction Algorithm for in Door Mobile Robot Navigations. International Journal of Signal Processing 3;4. Western Ontario, London, ON., N6A 5B9, Canada

Jie ,Jigui and Shengsheng,(2006d). Pattern Recognition: An overview. Proceedings to IJCSNS International Journal of Computer Science and Network Security, VOL.6 No.6. 130012 Changchun, China June 2006

Jiang and Jie,2000. An Adaptive Algorithm for Text Detection from Natural Scenes. University Pittsburgh. 2000

Kofi, Andrew, Patrick and Jonathan, (2007b).Run-Length Based Connected Component Algorithm for FPGA Implementation.University of Lincoln.England.2007

Kongqiao and Jari,(2003b).Character Location in Scene Images from Digitalcamera.Pattern Recognition. Proceedings to journal of the pattern recognition.Tampere,Finland.2003

Kwang,Keechul and Jin,2003c .Texture-Based Approach for Text Detection in Image Using Support Vector Machine and Continuously Adaptive Mean Shift Algorithm. IEEE Transtion On Pattern Analysis and Machine Intelligence, Vol. 25, No. 12, December2003

Kim ,Byun, Song, Choi, Chi and .chung, (2004).Scene Text Extraction Scene Images Using Hierarchical Feature Combining and Verification .IEEE . 1051-4651/04 . Proceedings of the 17th International Conference on Pattern Recognition

Mohanad and Mohammad, 2006e. Text Detection AND Character Recognition Using Fuzzy Image Processing. Proceedings to Journal of Electrical Engineering.Vol.57,No.5. Jordan. 2006

Matsuo,Ueda and Michio,2002d .Sxtraction of Sharacter String from Scene Smage Binarizing Local Target Aarea.Transaction of the Anstitute of Electrical Engineers.122-c(2).232-241 Japan.2004.

Pavilidis,(1977)., Structural Pattern Recognition, Springer-Verlag,New York, 1977.

Qixiang, Wen, Weiqiang and Wei (2003a).Roust text detection algorithm in images and video frames.IEEE.0-7803-8185-8.School of Chinese academy of scienes,China

Qixiang, Qingming, Wen and Debin,2005b .Fast and Robust Text Detection in Images and Video Frames.Image and Vision Computing 23.China.2005.

Roshanak and Shohreh(2005c).text segmentation from image with textured and colored background. Proceedings to Sharif University of Technology, Tehran, Iran

Rabbani and Chellappan,(2007a).Fast and New Approach to Gradient Edge Detection. Proceedings to International Journal of Soft Computing 2(2):325-330.india.2007

Rainer and Axel, (2002c). Localizing and Segmenting Text in Images and Videos. University Pittsburgh.2002

Sivanandam, Deepa and Sumathi,2007.Introduction to Fuzzy Logic Using Mathlab**.**

Tsai, Chen, Fang (2006c).A Comprehensive motion videotext detection localization and extraction method.IEEE.0-7803-9584-0.Taoyuan County 320,Taiwan P.R.C

Takuma, Yasuaki and Minoru, 2003d. Digit Classification on Signboards for Telephone Number Recognition .IEEE. 0-7695-1960-1. Proceedings of the Seventh International Conference on Document Analysis and Recognition. Japan.2003

Victor,Raghavan and Edward,(1999).Textfinder:an Automatic System to Detect and Recognize Text in Image.IEEE Tansaction on Pattern Analysis and Machine Intelligence,vol.21, no.11, Novermber 1999.Amherst

Xiaoqing and Jagath,.(2006a).Multiscale Edge-Based Text Extraction from Complex Image..IEEE.1-4244-0367-7.London, Ontario, N6A 5B9, Canada

Xilin, Jie, Jing and Alex, (2003e). Automatic Detection of Signs with Affine Transformation. University Mobile Technologies.2003

Yuzhong, kallekearu and anil,1995. Locating Text in Complex Color Images.