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A Review on Fuzzy Logic Based Object Recognition Techniques

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Abstract: this paper discussed about various object recognition techniques such as text detection and recognition system based on a scalable feature learning algorithm and applied it to images of text in natural scenes. We demonstrated that with larger banks of features we are able to achieve increasing accuracy with top performance comparable to other systems, similar to results observed in other areas of computer vision and machine learning. A novel approach to learning shape prior models from images annotated with bounding boxes. Based on the shape representation of oriented edge points, our learning process is robust to clutter. In Scale Invariant Feature Transform (SIFT) feature matching was adopted to distinguish text characters in different languages, and a voting and geometric verification algorithm was presented to filter out false positive matches.
Keywords: Object recognition, Object detection, Text Recognition, Invariant Feature Transformation

I. INTRODUCTION

Automatic reading of text in natural scenes and it is on the recognition of individual characters in such scenes. Highlight why this can be a hard task. Even if the problems of clutter and text segmentation were to be ignored for the moment, the following sources of variability still need to be accounted for: (a) font style and thickness; (b) background as well as foreground color and texture; (c) camera position which can introduce geometric distortions; (d) illumination and (e) image resolution. All these factors combine to give the problem a flavour of object recognition rather than optical character recognition or handwriting recognition. Furthermore, while training data is readily available for some characters others might occur very infrequently in natural scenes. We therefore investigate whether surrogate training data, either in the form of font generated characters or hand-printed characters can be used to bolster recognition in such a scenario. We also present baseline recognition results on the font and hand-printed character databases to contrast the difference in performance when reading text in natural images.

A. Segmentation

Scene text recognition, which aims to recognize text in natural scenes, remains a challenging problem. Compared to scanned documents, which are usually taken under uniform lighting with sharp focus, scene text images often contain undesirable lighting effects, such as specular highlights, glossy reflections, and shadows; and the camera's focal and motion blur add additional difficulty to the recognition task. Scene Text Recognition: Scene text recognition is an important research problem in computer vision. Among existing solutions, one popular approach is to use sliding windows over the whole image to extract features for text detection and recognition. Another approach is based on Maximally Stable External Regions (MSERs). For example, in MSER has been used for localizing text in images. In the MSER-based method is further improved by constructing an MSER tree and applying an effective pruning algorithm. Instead of using MSER, in a feature calculator is integrated into the process of computing External Regions (ER), which enables efficient evaluation of all ERs.

Text Segmentation: Text segmentation aims to detect and split an image into regions of text (foreground) and background. A classic approach for segmentation is to use thresholding. A survey of such approaches can be found. Traditional thresholding - based algorithms are suitable for scanned documents, which are usually taken under uniform lighting with sharp focus. Thus the pixel values naturally form two clusters. However, such an approach is difficult to apply in scene text segmentation, due to the significant colour variations and illumination effects in natural images.

II. RELATED WORK

A. Histograms Of Oriented Gradients For Human Detection

Detecting humans in images is a challenging task owing to their variable appearance and the wide range of poses that they can adopt. The first need is a robust feature set that allows the human form to be discriminated cleanly, even in cluttered backgrounds under

difficult illumination. We study the issue of feature sets for human detection, showing that locally normalized Histogram of Oriented Gradient (HOG) descriptors provide excellent performance relative to other existing feature sets including wavelets.

B. Character Recognition Method In Natural Scene Images

Commercial OCR (Optical Character Recognition) systems have a good performance when recognizing machine-printed text in camera-based document analysis. However, they do not work well for reading text in natural scenes, where text is usually embedded in complex backgrounds and many problems arise due to geometric distortions, partial occlusions, changes in illumination different font styles, font thickness, font color and texture, among others. Therefore, the task of recognizing text in natural images still remains an active research topic. Proof of this is the few works that have competed in the Robust Reading Competitions in the challenges of text recognition, where no work was presented and only four works competed.

C. Text Detection And Character Recognition In Scene Images With Unsupervised Feature Learning

Detection of text and identification of characters in scene images is a challenging visual recognition problem. As in much of computer vision, the challenges posed by the complexity of these images have been combated with hand designed features and models that incorporate various pieces of high-level prior knowledge. In this paper, we produce results from a system that attempts to learn the necessary features directly from the data as an alternative to using purpose-built, text-specific features or models.

D. Detecting Text In Natural Scenes With Stroke Width Transform

Detecting text in natural images, as opposed to scans of printed pages, faxes and business cards, is an important step for a number of Computer Vision applications, such as computerized aid for visually impaired, automatic geocoding of businesses, and robotic navigation in urban environments. Retrieving texts in both indoor and outdoor environments provides contextual clues for a wide variety of vision tasks. Moreover, it has been shown that the performance of image retrieval algorithms depends critically on the performance of their text detection modules. For example, two book covers of similar design but with different text, prove to be virtually indistinguishable without detecting and OCRing the text. The problem of text detection was considered in a number of recent studies.

E. Learning Shape Prior Models For Object Matching

The shape model from examples is to first compute the mean shape. The mean shape is formulated as the optimal solution to minimize a cost function. This cost function can be the dissimilarity measure between the mean shape and all training shapes. Different cost functions lead to different optimization frameworks. However, it is difficult to learn shape models from real images because of (a) scene clutter and (b) intra-class variations of the shape. The combination of these two issues makes the complexity combinatorial. Due to the large number of possible shapes and images, it is not tractable to try each possible hypothesis to find the optimal solution. For this reason, almost all the methods for learning shape models have been experimented on clean training data (images without clutter). Contrary to these approaches, the method we propose is very robust to clutter.

To find the mean shape, there are two important questions to answer: (1) how to design the cost function and (2) how to find tractable optimization schemes when the mean shape is formulated as the solution to minimize the designed cost function. The answer to the first question clearly depends on the representation of the training images. Using edge points is often the preferred choice but points alone are not very informative (the optimization can be slow and have many local minima). Using more complex features is possible (for example, PAS, fragments or shape context but they are vulnerable to edge clutter and are often object specific. Furthermore, according to complex features often only postpone the complexity problem. To deal with clutter in the training images, we use orientation plus edge points because this combination is local (clutter has almost no effect), generic and the orientation is helpful to remove clutter. To our knowledge, oriented edge points have not been used in the shape learning and matching literature despite their simplicity and the robustness. “Edgelet features” are similar to what we propose, but they are only defined for short lines and segments. One of our contributions is to reformulate the definition given by in order to include a shape distance using edge orientation.

A novel approach to learning shape prior models from images annotated with bounding boxes. Based on the shape representation of oriented edge points, our learning process is robust to clutter. The shape prior learned by our approach is a prior on shape deformations which can separate the non-affine transformation and affine transformations based on the TPS parameterization. This is very useful to learn the intra-class variability of the shape. Second, we applied the learned shape prior model during shape matching based on TPS-RPM framework and found a closed form solution for TPS transformation. We illustrated our approach on

datasets of real images and the experimental results show that our approach can improve both learning accuracy and matching accuracy compared to previous work.

F. Color Reduction For Complex Document Images

The aforementioned classical color reduction techniques, some other interesting general color reduction techniques have been proposed. The RGB color space is repeatedly divided into small color classes. The colors of the image are projected on a line, which preserves the mcolor distances, and the projection values initially form two principle colors. This is repeated until the desired number of colors is achieved. The line used for the projections is defined by the mean color vector and color of the largest distance away from the mean color. The problem of color reduction with a fuzzy based technique. The authors propose an improved version of the FCM algorithm to produce visually superior images at a reduced computational cost. Edge information is used to adaptively reduce the colors and preserve the images' details. It is designed for use in content-based image retrieval applications.

A novel document color reduction-segmentation technique appropriate for text information extraction applications is presented. First, with an efficient sub-sampling technique the RGB color distribution of the original image is approximated. The selected samples are obtained after extracting the edge map of the image and selecting only those points which are local minima in a eight neighbourhood. The obtained samples are then used to initially reduce the colors of the image. A mean-shift procedure, starting from the points obtained after the initial color reduction, locates the final color canters.

G. Real-Time Scene Text Localization And Recognition

Text localization and recognition in real-world (scene) images is an open problem which has been receiving significant attention since it is a critical component in a number of computer vision applications like searching images by their textual content, reading labels on businesses in map applications (e.g. Google Street View) or assisting visually impaired. Several contests have been held in the past years and the winning method in the most recent contest was able to localize only 62% words correctly despite the fact that the dataset is not fully. The "false positives" in the image are caused by watermarks embedded into the dataset. This demonstrates robustness of the proposed method against noise and low contrast of characters (in the bottom-right corner the area of interest is enlarged and contrast artificially increased.

In general, scene text characters are composed of cross-cutting stroke components in uniform colors and multiple orientations, but they are usually influenced by some font distortions and background outliers. We observe that text characters from different categories are distinguished by boundary shape and skeleton structure, which plays an important role in designing character recognition algorithm.

H. Disadvantages

1) The existing system cannot accurately recognize text information directly from camera-captured scene images and videos.

2) The existing system is sensitive to font scale changes and background interference.

Noise occur

n Yang develops an algorithm for gesture recognition by means of a Time Delay Neural Network (TDNN), which uses time windowing on each layer to analyze the signals on the time domain. This ANN searches for point trajectories in video sequences for gesture detection.

Bellman et al. (2011) where the two basic operations-abstraction and generalization - were proposed. Abstraction in fuzzy set theory means estimation of a membership function of a fuzzy class from the training samples. Having obtained the estimate, generalization is performed when this estimate is used to compute the values of the membership for unknown objects not contained in the training set.

In this study state of the art of the fuzzy logic based visual object recognition systems is discussed. One of the major objectives of the computer vision is to recognize various objects from images. Application of fuzzy logic facilitates the smooth translation of ambiguous image information into natural language which can be processed by fuzzy set theory. Various methods of fuzzy object recognition are presented. Some rule based techniques are mentioned to show the applicability of object recognition in consumer electronics. A brief summary of fusion with neural networks and genetic algorithms is given.

This study OD3DM (Object detection and 3D modelling) mainly discussed the process to detect complex geometric objects and thereafter performing 3D modelling of geometric objects using Entropy based selection of optimum transformation of input data, wavelet based transformation and fuzzy logic techniques for designing and training of object recognition systems using realistic 3D computer graphics models using Fuzzy Logic has been implemented in this study. Our model OD3DM system convert picture into grid of size 10x10.10x20, 20x20 and uses centroid formula to detect geometric objects which detect edge and boundary limit of

every image taken from real time camera. We look at the relation between the size of the training set and the classification accuracy for a basic recognition task and provide a method for estimating the degree of difficulty of detecting an object. A few images were taken and were captured using real time camera. We show how to sample, align, detect, and rotate images of objects. We address the problem of training on large, highly redundant data and propose a novel active learning method which generates compact training sets and compact classifiers. We believe that the use of realistic 3D models and computer graphics for view-based object recognition will lead to a revaluation of some of the basic research questions in this area. The problems of learning from small training sets and learning from data with inaccurate or missing ground truth will lose importance while the problem of learning from large, accurately labeled but highly redundant data will become more important.

III.CONCLUSIONS

This paper studied about various object recognition techniques and features and problems of each techniques also this work have case study about various Current optical character recognition (OCR) systems can achieve almost perfect recognition rate on printed text in scanned documents. In the existing system the inner character structure is modeled by defining a dictionary of basic shape codes to perform character and word retrieval without OCR on scanned documents. In Scale Invariant Feature Transform (SIFT) feature matching was adopted to recognize text characters in different languages, and a voting and geometric verification algorithm was presented to filter out false positive matches. Dictionary of words to be spot is built to improve the accuracy of detection and recognition. Character structure was modeled by HOG features and cross correlation analysis of character similarity for text recognition and detection. In, Random Ferns algorithm was used to perform character detection and constructed a system for query-based word detection in scene images.

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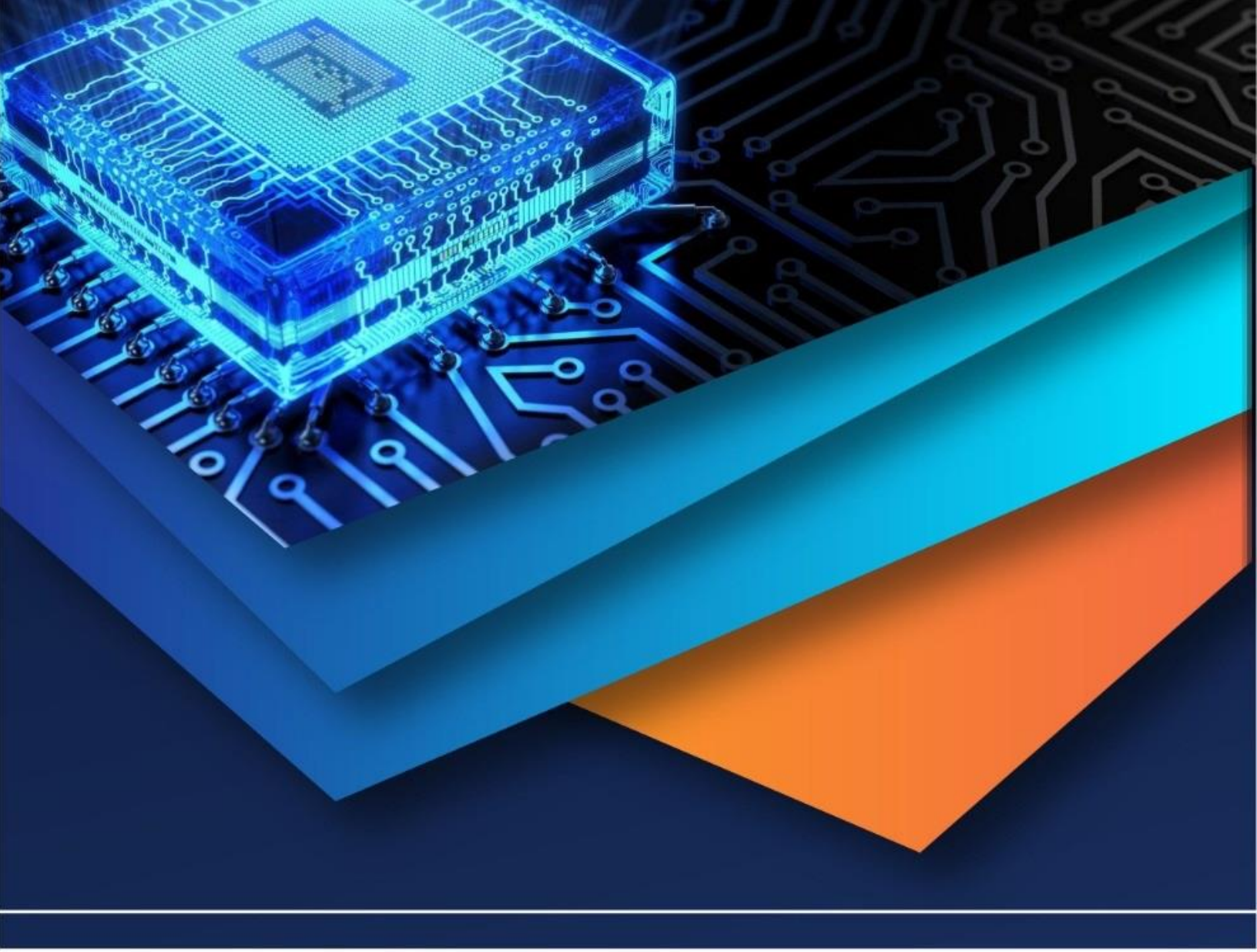

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