INTELLIGENT AGENT DRIVEN FEATURE EXTRACTION SYSTEM

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ABSTRACT

Object detection is one of the important tasks in many computer vision applications. Detecting and localizing randomly oriented objects in pick-and-place systems. Intelligent agent is a fast emerging technology and has wide range of applications. Intelligent agents can become more intelligent, more efficient, if the computer vision. Although there are several tools for agent development, there is few design tool to assist the conversion technique can be able to introduce in those machines and this combining process has already been conducted. This is a fascinating field of research, innovation, and this fascination leads the project to design an intelligent agent for disaster management operation.

KEYWORDS: Object Detection, Computer Vision, Feature Extraction, Intelligent Agent.

INTRODUCTION

Object recognition is an important task associated to mobile robots. It deals with detecting instances of semantic objects of a certain class (such as human, car, flower, fruit, animal and other classes) in digital image and video. The robot must be able to recognize the objects present in its working environment. Information to distinguish corners from non-corners has been provided by examining second-order difference of contour (SODC) regular distribution in [25]. The paper starts with this introductory section, describing the mobile robot and its object recognition system main characteristics, and continues with other section, which describes in details the strategy adopted for the object recognition. A vision system for assistive robots that is able to detect and recognize objects from a visual input in ordinary environments in real time has been presented in [26]. Besides the performance of feature detectors and descriptors of 3D object has been explored in paper [2]. Simultaneous localization and mapping (SLAM) method, has been proposed in [12] for agents and subsystems to work in parallel and share information.

LITERATURE REVIEW

Using Conventional methods it has been difficult to achieve optimal sensor placement graph because of the large scale, highly nonlinear features of the problem. Therefore a method has been proposed in [1]

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For Automatic sensor placement for model based robot vision. The sensor has been moved in different positions around the object in different directions to capture three dimensional images. In this paper resolving of an optimal sensor placement with a shortest path has been evaluated with the help of a genetic algorithm. This algorithm has helped to deal with complex objects with numerous inspected features and it has triggered global optimization. Besides this, performance of feature detectors and descriptors of 3D object has been explored in paper[2]. For this a method intersecting epi-polar constraints has been designed and most vigorous viewpoint changes has been marked by combining Hessian-affine feature finder and SIFT features. A new method has been established for geometrical features in different views of 3D objects. This has helped to step up detector-descriptor evaluations from 2D scenes to 3D objects. This step up has been inexpensive along with this use of heterogeneous collection of 100 three dimensional objects and use of Lowe's ratio has given better results in lightning and change in scale. The detectors and descriptors has been the best when tested for robustness. On the other hand for image feature detection, parallel hardware architecture based on scale invariant feature transform algorithm has been proposed in [3]. The architecture has been applied on simultaneous localisation and Mapping problem. The projected architecture has been given the ability to read data directly from a CMOS image sensor. Along with this the architecture also has shown results on a field programmable array fixed to a processor through an Ethernet connection. For better performance higher number of features per frame has been extracted by upgrading the NIOS2 softcore processor to a faster stage. Meanwhile in [4], the probabilistic approach to the problem of recognizing places has been described based on appearance. The above mentioned system has not been limited to localization but has been taken based on unseen places. In this paper, probabilistic approach has allowed for perceptual aliasing in the environment. For this a generative model of place appearance has been achieved. The learning problem has been partitioned into two parts and new place models can be learned online from only single observation of a place. The algorithm complexity has been linear in places in the map. On the other hand the process of imaging coloration pattern in fingernail and nearby skin to get fingertip force direction has been proposed in [5]. Nail images has been extracted from 15 subjects. From this common characteristics related to force directions has been spotted out with the help of linear discriminant analysis. In this paper recognition accuracy on 15 subjects has been proved to be 90% accurate. With the help of individual training the recognition accuracy on test images has been 94%. On the other hand pedestrian detection by a novel ensemble method has been addressed in [6].In this paper with the help of Multilayer Perceptrons (MLPs) and support vector machines (SVMs), histograms of oriented gradients (HOGs) and local perspective fields (LRFs) have been classified. For this initial set of feature extractors and classifiers have been refined using diversity measure. An ultimate classifier ensemble have been structured by an HOG and an LRF. Two classes of fusion method such as majority vote and fuzzy integral have been used for combining the outputs of component classifiers. With the help of experiments the fact that has been highlighted is that the state-of-the art classification system have provided better results than component classifiers. On the other hand in [7] a vision inspection system using structured light has been offered. In this paper with the help of inspection system dimensions of the weld bead have been calculated in root pass and cap welding. Along with this defect detection with visual feature
has also been implemented here. The vision inspection system have been calculated in scales. From experimental results weld bead dimensions (groove width weld bead width) have been automatically measured. Other defects have been detected online. Meanwhile in [7] a simultaneous localization and mapping based on insight have been proposed that can make problem tractable.

In this paper it has been noted that choice of a single privileged coordinate frame can make the bundle adjustment expensive, so a relative approach has been adopted. The bundle adjustment has been found to work in a metric space. An adaptive optimization strategy has been adopted to solve experimentally full maximum-likelihood solution incrementally in constant time. The system has been given the ability to operate online in real time with fast appearance based loop closure detection. Based on this shortest paths in relative maps has been build both in terms of time and distance. On the other hand in paper [9] decentralized platform for simultaneous localization and mapping (SLAM) with multiple robots have been developed. In this paper to extend the approach to multiple robots a novel occupancy grid map fusion algorithm have been proposed. The map learning method has been the process based on the self-organizing map. The new method has been using an SOM to lower down the complexity of occupancy grid maps. As a result map fusion have been achieved more effectively. The novel aspect of the approach consisted of preprocessing of occupancy grid maps. Som method has been used to learn and accumulate maps and determine relative rotation. The approach has been marked for faster exploration and mapping of unknown environments. Meanwhile identifying non wet socket joints by using 2D or advanced X-ray tools has been implemented in [10]. In this paper an automatic defect detection algorithm has been proposed to effectively spot the non-wet joints in processor sockets. Average of 150 images have been taken and examined by an operator to determine if the individual joints are effective or not. But this is time consuming. So the above said algorithm has been used. The algorithm has been capable of spotting the non-wet joints in socket images that has been taken at different oblique angles. The results have shown a detection rate of 95.8% which is 21% to 53% better than commonly used inspection machines. The proposed algorithm has been given the capability to effectively reduce false positive rate, false negative rate and also inspection time. Simultaneous localization and mapping (SLAM) method, has been proposed in [12] for agents and subsystems to work in parallel and share information. In this task, a robot has been placed in a priori unknown environment and tries to build a map of the environment and also situate itself within the map simultaneously. SLAM has been very useful in rescue operations, fire-fighting, underwater etc. In continuation of SLAM a new methodology has also been proposed in [12] which uses Self-Organizing Maps (SOM) to reduce the complexity of the acquired occupancy grid maps. Preprocessing of occupancy grid maps using map segmentation method, determining the relative rotation and the translation of two maps using the cluster points has been included in this approach which leads to faster exploration and mapping of unknown environments. Active vision method has been proposed in [13] to increase the accuracy in identification and authentication of object in which multiple viewports are considered obligatory for recognition of objects in [13]. The method allows a robot to actively search environment for more informative views. Selecting the next best viewpoint and integration of relevant information has been the main focus areas of active object detection. In this paper, active vision system has been verified to be more beneficial than randomly
selecting next viewpoint for object recognition and detection. Later findings in the paper [13] indicates that a framework has been developed for 3D object recognition and verification process. Combination of classical tools from computer vision and deep learning (bottom-up region proposals and convolutional neural networks) had been considered as the main tool.

In this paper, a computationally efficient algorithm which is able to detect moving objects accurately and robustly in general 3D scene has been proposed in [23]. Information to distinguish corners from non-corners has been provided by examining second-order difference of contour (SODC) regular distribution in [25]. Two novel corner detectors based on second-order difference of contour (SODC) has been proposed to enhance the performance of contour-based corner detectors. In this paper, a survey and comparative study on existing approaches of visual place recognition including place feature extraction methods, image similarity metrics and searching algorithms, as well as some benchmark datasets and evaluation metrics has been presented in [27]. The methods combining feature extraction using convolutional neural networks (CNN) and sequential image searching achieve higher precision in large scale dynamic environment has been shown experimentally. An effective, efficient, and robust method to accurately detect and segment multiple independently moving foreground targets from a video sequence taken by a monocular moving camera [e.g., onboard an unmanned aerial vehicle (UAV)] has been proposed in [28]. End-to-end learning of monocular semantic-metric occupancy grid mapping from weak binocular ground truth has been researched and evaluated.

**SYSTEM MODEL**

The intelligent agent has been equipped with sensors or cameras to take input from environment. The system model of the scheme is shown below:

![System Model Diagram](image)

The inputs have been taken by some sensors or by capturing image or by capturing video from the environment by the intelligent agent. From those input set images have been passed through Convolutional Neural Network (CNN). In CNN image has been passed through different filters and from those output of the filters huge number of features have been extracted. The outcome of the CNN has been analysed and the detected object is identified.
or classified as human or kid or any living species then the agent will send immediate rescue signal. The entire identification process is termed here as learning module. By obtaining the signal the intelligent agent move forward and rescue the human being. Movement action is done by the actuators. As a result action has been observed by the intelligent agent in the environment.

**PROPOSITION**

The robot has been dependent on learning model. It may not be able to identify between thin and healthy person and so may fail sometime to identify human. So feature extraction should be done in such a way that such that it can identify all kinds of human beings. Feature extraction need to be improved to make it more robust. Suppose the agent is working with the rescue team. Feature extraction should be done in such a way so that a robot can distinguish between an injured human being and a rescue operator person. Moreover, an intelligent agent will not be able to extract features in darkness that is during night time and in underwater rescue operation. Furthermore agents are not adapted to wireless communication.

**CONCLUSION**

The proposed project is the outcome of two different domains of research. It has been grown with the help of Computer vision and Robotics. The project is highly dependent on the ideology of Convolutional Neural Network feature extraction. The CNN has helped to convert a normal robot into highly efficient intelligent agent to perform disaster management operation. But the robot has a few shortcomings which can be overcome in future. The machine learning algorithms has to be implemented in such a way so that the agent can extract features correctly. Distinction between severely injured and mildly injured person can be overcome by using high efficient sensors. Shortcomings need to be handled properly to make the agent more robust and effective.

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