

Urban Street Cleanliness Assessment Using Mobile Edge Computing and Deep Learning

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ABSTRACT

Object detection is a central task in computer vision, with applications ranging across the process of smart city construction, city managers always spend a lot of energy and money cleaning street garbage due to the random appearances of street garbage. As deep network solutions become deeper and more complex, they are often limited by the amount of training data available. With this in mind, to spur advances in analyzing and understanding images, Open CV or Google AI has publicly released the Open Images dataset. Open Images follows the tradition of PASCAL VOC, Image Net and COCO, now at an unprecedented scale. In this project we to implement the Consequently, visual street cleanliness assessment is particularly important. However, existing assessment approaches have some clear disadvantages, such as the collection of street garbage information is not automated, and street cleanliness information is not real-time best performing algorithm for automatically detecting objects. Finally, the results are incorporated into the street cleanliness calculation framework to ultimately visualize street cleanliness levels, which provides convenience for city managers to arrange clean-up personnel effectively.

KEYWORDS: OPEN CV, DEEP NETWORK, OBJECT DETECTION, IMAGE, NET, COCO.

INTRODUCTION

Street cleaning is an important city service, which involves a set of activities concerning the cleanliness of the street (usually defined as pavements and adjoining edges of roads and grassed and planted areas) . Therefore, it involves street-sweeping (whether manual or machine), litter-picking, the uplift of fly-tipped refuse and the removal of graffiti and flyposting. When the street cleaning service is ineffective, the evidence is visible. And it could cause a significant impact on the quality of life and the attractiveness of its neighborhoods, towns and cities. Moreover, people believe that there are the links between environmental problems and other forms of disorder and crime in cities. On the other hand, good quality street cleaning service in a city provides and contributes the good environmental quality in its communities and neighborhoods, which can help urban development, make places attractive to tourists, investors and mobile workers . Moreover, the effective street cleanliness could reduce the costs in cleaning underground water systems for cities. For this reason, researchers around the world are studying automated approaches, using a cleaning vehicle with cameras to capture the streets regularly and collect street information, such as street pictures, geographical location, date and time. Besides, existing object detection algorithms are used to detect images in the remote cloud platform. Finally, the detection results are sent to the city managers for decision making.

LITERATURE SURVEY

Smart city construction has become the focus of the whole society. Smart cities use intelligent methods to sense and handle urban activities through the Internet of Things, cloud computing and other technologies, which can improve the quality of service in all aspects of society and economy Meanwhile, smart cities can also achieve the purpose of reducing costs and resource consumption. Currently, many scholars in the world have done many researches related to smart cities Mysore proposed a planning framework called “Smart City Reference Model”. Urban planners can use the framework to define the smart city concept and apply an urban layout to green, interconnected, open, integrated, smart, and innovative concepts. The framework provides an idea for realizing sustainable development of a smart city. The recent practical application is to analyze smart city planning in big cities such as Ashokpuram, Metagalli, and Brindavan Extn. combined a smart city and life cycle concept to create a suitable information and knowledge sharing platform in a smart city. It aims to solve the problem of unreasonable arrangement, lacking planning and internal coordination of large activities in the city, which can achieve the goal of organizational consistency and efficiency. In addition, Large companies also attempt to put into the research of the smart city. India Telecommunication carried out the development plan of smart city, focusing on 12 theme applications including smart community, smart transportation, smart energy, smart medical services and etc. IBM launched the Watson “Big Data and Analysis Platform” to help solve smart city problems such as smart transportation and air pollution. Microsoft launched the “Future City” plan to solve challenges such as environmental deterioration and traffic congestion by acquiring, integrating and analyzing multiple heterogeneous big data in the city. However, to the best of our knowledge, there is no specific research topic on urban cleanliness for the construction of a smart city.

EXISTING SYSTEM

We describe a novel edge computing framework. There is an edge layer between cloud servers and terminals. We configure edge servers (microdata centers) to handle a part of services from devices at the edge layer. It can also store data resources temporarily and transmit data resources in time. Faster R-CNN is used to identify street garbage categories and count the number of garbage. A multilayer assessment model across different layers is used. The whole city is divided into 5 layers: city, area, block, street, point. Every layer will carry out street cleanliness calculation. We provide a public garbage data set collected by ourselves, which can be used as a benchmark for evaluating street garbage detection and street cleaning. Furthermore, we use the data set to give a visual street cleaning map for Mysore District, In Karnataka, India. The application validates the feasibility and usability of the proposed approach. The results are useful for improving and optimizing city street cleanliness. The rest of this paper is organized as follows: Existing work and their limitations are discussed in Section . Section provides some preliminary knowledge including mobile edge computing, multi-layer assessment model, and deep network. Urban street garbage detection and cleanliness assessment approach is provided in Section 4. In Section 5, we use street images collected from Mysore District to validate our approach. An image classification or image recognition model simply detects the probability of an object in an image. In contrast to this, object localization refers to identifying the location of an object in the image. An object localization algorithm will output the coordinates of the location of an object with respect to the image. In

computer vision, the most popular way to localize an object in an image is to represent its location with the help of bounding boxes.

DISADVANTAGE:

1. Need a large dataset.
2. Because you need a large dataset, training time is usually significant.
3. Takes lots of time to train and stuff with the availability of large amounts of data, faster GPUs, and better algorithms.

PROPOSED SYSTEM

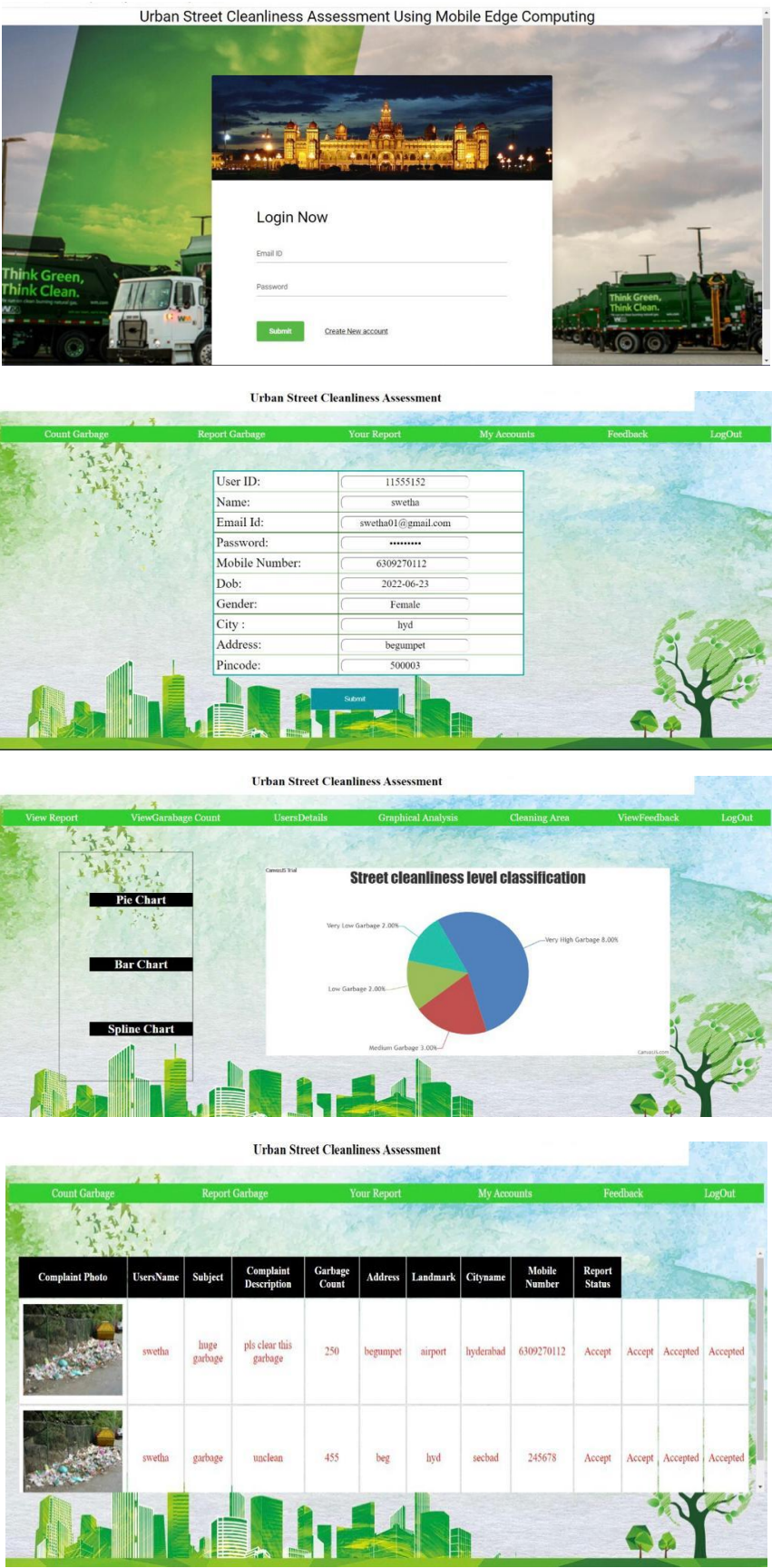
Smart city construction has become the focus of the whole society. Smart cities use intelligent methods to sense and handle urban activities through the Internet of Things, cloud computing and other technologies, which can improve the quality of service in all aspects of society and economy. Meanwhile, smart cities can also achieve the purpose of reducing costs and resource consumption. Currently, many scholars in the world have done many researches related to smart cities. Bangalore proposed a planning framework called “Smart City Reference Model”. Urban planners can use the framework to define the smart city concept and apply an urban layout to green, interconnected, open, integrated, smart, and innovative concepts. The framework provides an idea for realizing sustainable development of a smart city. The recent practical application is to analyze smart city planning in big cities such as Mumbai, Chennai, and Kolkata combined a smart city and life cycle concept to create a suitable information and knowledge sharing platform in a smart city. It aims to solve the problem of unreasonable arrangement, lacking planning and internal coordination of large activities in the city, which can achieve the goal of organizational consistency and efficiency. In this case of the Challenge; we have to build to build the best performing algorithm for automatically detecting relationships triplets.

ADVANTAGES:

1. Object detection is breaking into a wide range of industries, with use cases ranging from personal security to productivity in the workplace.
2. It can also be used within a visual search engine to help consumers find a specific it empoweful image analysis and objects detection.

RESULTS

Testing is a process, which reveals error in the program. It is the major quality measure employee during software development during software development. During testing, the program is executed with a set of test cases and the output of the program for the test cases is evaluated to determine if the program is performing as it is expected to perform. Software testing is a critical element of software quality assurance and represents the ultimate review of specification, design and coding. The increasing visibility of software as a system element and attendant costs associated with a software failure are motivating factors for we planned, through testing. Testing is the process of executing a program with the intent of finding an error. The design of tests for software and other engineered products can be as challenging as the initial design of the product itself.



The development of novel technologies has driven a number of cities into the way to smart cities. Street cleanliness is one of the concerns for smart cities. Consequently, this paper proposes a novel urban street cleanliness assessment approach using mobile edge computing and deep learning. A visual street cleanliness road diagram is presented, such an automated system can help city administrators to know the cleaning state of the street easily. Several directions for future work are possible. These directions are described as follows:

1. We plan to develop a solution that can automatically implement image filtering preprocessing at the mobile edge because manual filtering greatly affects the real-time transmission and wastes time.
2. Our model contains common street garbage data. However, the model does not play a great role in the Uncommon garbage data. Thus the Training data needs to be further expanded the Accuracy of the Model.

FUTURE SCOPE

This application is very much useful in urban street cleanliness mainly for smart city construction for clean and green in urban developing. The same project in future we can implement and develop a mobile application it is very much easy for every user to use. Further it can use a drone system and update as accordingly. We can reach out and make out mobile applications by which we can implement this urban cleanliness widely and Quickly to make out fast smart city construction.

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