Ml Based Waste Segregator

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Abstract- *The rise in human population and urbanization has led to a growing amount of waste. In urban areas, overflowing bins lead to unsanitary conditions. As a result, the environment deteriorates, and to address this issue, the "ML Based Waste Segregator" has been developed to alleviate the burden on ragpickers. Human waste segregation can lead to health issues for the workers. The proposed system separates the waste into three categories namely Plastic, Glass and metallic waste. This developed system is not only cost efficient also makes the waste management productive one. Each of the wastes are detected by the respective sensors and gets segregated inside the bins which is assigned to them the details of amount of waste disposal is updated in the server regularly.*

Keywords- Deep Learning; Convolution Neural Network; Plastic Segregation, Glass Segregation, Metal Segregation; Waste classification

I. INTRODUCTION

The CP-ABE is much more flexible than plain identity-based encryption, in that it allows complex rules which specify private keys can decrypt cipher text. The identity-based encryption can be done by using one public key and Master Private Key used to make more restricted private keys. But there is very expressive rules for which private keys can decrypt .They are Private keys have "attributes" or labels and Cipher texts have decryption policies. You can consider CP-ABE as an extension of identity-based encryption. Similar to identity-based encryption, identity-based encryption involves a single public key, and a master private key can be employed to generate more restricted private keys. Using a few keys to encrypt many files may lose the fine grained control we had over access policies. More specifically, private keys are linked to sets of attributes or labels, and during encryption, we encrypt based on an access policy that defines which keys have the ability to decrypt. To access any files in remote storage the scalable and reliability is an important property. As we make additional copies of our files, we increase the potential vulnerabilities and the level of trust needed. To address this issue, CP-ABE could offer a solution. The abstract syntax has been ex-tended to include set and set operations to model role-based access control requirements. A set can be used as a component itself or can be an attribute of a component. Basic set operations such as union, compliment, and intersection are allowed. It also includes membership and cardinality. A session can be represented as a component and may have active roles as an attributes. Objects are represented as components and operations performed on them are represented as its states

We integrate RBAC model into CP-ABE to provide a more expressiveness of policy specification. In the policy tree structure, the operations AND, OR, and K of N are supported to logically express the natural evaluation for roles and attributes as the access control rules. The policy also accommodates the privilege (read or write) of users for each role distinctively. User attributes from multiple domains can be specified under the respective policy of any data owners. We demonstrate the efficiency and practicality of the access control features through the functionality evaluation. Regarding the scalability, the proposed model enables CP-ABE policy tree to support a more large number of users and better attribute management by assigning a group of attributes belong to the specific role. This enables the model is scalable in terms of multiple user management. In addition, we exploit user decryption key graph (UDKG) to make all user decryption keys are securely stored in a cloud. User keys will be dynamically invoked upon the user's request for access. This provides zero cost for key distribution and enables efficient multiple keys assignment and retrieval. This is a desired feature that could make our proposed model is practical in a large scale of data sharing environment where there is multi-user, multi-owner, and multi-authority. In contrast, approaches based on CP-ABE require distributing every user decryption keys to all individual users who request for the key. The cost for key delivery therefore depends on network conditions and is linear to the number of registered users.

II. LITERATURE REVIEW

To reduce human efforts on mechanical maneuvering different types of robotic arms are being developed. These arms are too costly and complex due to the complexity and the fabrication process. Most of the robotic arms are designed to handle repeated jobs. In design of the robotic are different parameters are to be taken care. The design of mechanical structure with enough strength, optimum weight, load bearing capacity, speed of movement and kinematics are important parameters. In electronic design the specification of the motors, drives, sensors, control elements are to be considered. In the software side the reconfigurability, user interface and implementation and compatibility are to be considered. Some voluntary records of robotic arm are given as follows:

1.Object detection and tracking using image processing (2014):
Abstract: – This paper mainly focuses on the basis to implement the object detection and tracking based on its color and shape.
Proposed approach: – This paper mainly focuses on the basis to implement the object detection and tracking based on its color.

2. Real Time Object Detection & Tracking System (locally and remotely) with Rotating function (2013):
Abstract: – This paper presents an implementation of real time detection and tracking of an unknown object
Proposed approach: – Detection of a moving object is necessary for any surveillance system.

3.Mobile Robot for Object Detection Using Image Processing (2012):
Abstract: – This paper describes a robotic application that tracks a moving object by utilizing a mobile robot with sensors and image processing.
Proposed approach: – In the majority of surveillance and video tracking systems, the sensors are stationary.

4. Color Image Processing and Object Tracking System (1996):
Abstract: – This report describes a personal computer-based system for automatic and semiautomatic tracking of objects on film or video tape.
Proposed approach: – The Tracking System achieves the automation by integrating the discrete components into a cohesive system

5.Practical Applications of Robotic Hand using Image Processing (2015):
Abstract: – Robotic hand is used in image processing our paper Presents various application for robotic hand.
Proposed approach: – The robot and robotic arm provide main function and useful for human worker in industry.

III. METHODOLOGY

1. Image Capture and Processing:

a. Capture images or video frames from the camera using OpenCV in Python.
b. Preprocess the images to enhance object detection. Common preprocessing steps include resizing, normalization, and noise reduction.

2. Object Detection:

a. Train or use a pre-trained deep learning model for object detection. You can use a model like YOLO (You Only Look Once) or Faster R-CNN.
b. Use TensorFlow or PyTorch to load the model and perform inference on the captured images.
c. Identify and classify objects (plastic, glass, metal) in the images.

3. Decision Making:

a. Based on the object detection results, decide which class (plastic, glass, or metal) the detected object belongs to.
b. You can set up thresholds or confidence scores to make these decisions.

4. Arduino Control:

a. Communicate with the Arduino board using serial communication (e.g., via USB).
b. Send commands to the Arduino to actuate the sorting mechanism. For example, if an object is identified as plastic, activate a mechanism that routes it to the plastic bin.
c. The Arduino should control motors, servos, or other actuators to move the objects accordingly.

5. Feedback and Monitoring (Optional):

a. Implement feedback mechanisms to confirm that the object was sorted correctly. You might use additional sensors to verify this.

6. Iterate and Optimize:

a. Test your system, gather data, and refine your object detection and sorting algorithms.

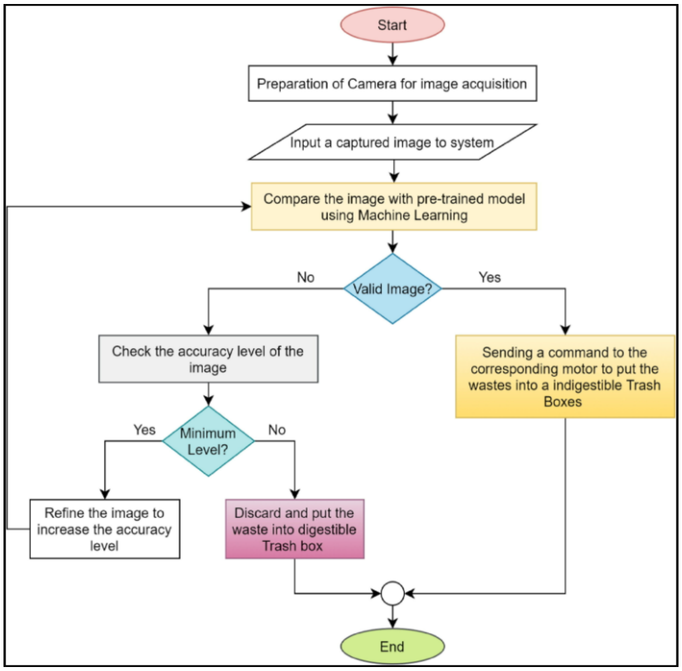
7. Safety Measures:

a. Ensure safety features are in place, such as emergency stop buttons or sensors to detect obstructions in the sorting process.

8. Deployment:

a. Once your system is working reliably, you can deploy it for automated garbage sorting.

IV. WORKFLOW



The camera module is attached to the microcontroller of the proposed system and responsible for capturing images of wastes. The diagram in Fig. illustrates the flowchart of a camera module. Initially, the system undergoes initialization and readies itself for image acquisition. The camera module captures an image and transmits it to the microcontroller. Upon receiving the image, the microcontroller passes it to a pre-trained CNN model, which provides an assessment of the image. The microcontroller utilizes the CNN's response to guide a servo motor in placing the waste into the appropriate trash container. This decision hinges on the probability of whether the waste is categorized as digestible or indigestible. The servo motor executes its task by collecting the waste and depositing it in the corresponding trash container."

V. CONCLUSION

With the advent of deep network architectures, this system proposes the idea of fully automated waste segregation using deep learning. To put it into practice, the system requires extensive datasets, pattern predictions for object detection, and training algorithms. Thus this system, aids in reducing air pollution levels as the people will stop burning plastic and paper waste and in the long run focuses on the development of universal waste segregation framework.

VI. FUTURE SCOPE

- In our current state we are capable of identifying and segregating waste one by one. In most real world cases waste is pretty diverse and large amounts are dumped at once.
- Thus, there is a need for increasing segregation and larger scale implementation of the project with multiple cameras and sensors.
- This would also require more compute power. In our system, we have only five types of wastes to classify.
- When working with different regions we may come across different materials which need new classification thus increasing the number of items that the model can classify. This will require more training data with more diversity to increase the capacity.
- The computing power will also need to be increased to accommodate better machine learning model. In our current system we use Ultrasonic for only identifying that there is an object.
- In future this can be improved by using more sensors such as infrared and LiDAR sensors which give us more data to predict the waste more accurately. We would also be able to get more insight on what the object composition with better and more sensors.

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