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Vocal Vision for Visually Impaired People

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VOCAL VISION FOR VISUALLY IMPAIRED PEOPLE

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ABSTRACT

The project is an endeavor to provide the visually impaired with a friend, more dependable and dedicated than most humans can ever be. There are many services for the blind to find objects, but none of them manage to give an avoid description of the same. It presents a unique way of navigating with assistance from the only AI a blind person will ever need. Object Detection Using sophisticated object detection algorithms, implemented from scratch on a Tensorflow library on a native Android device by incorporating a trained classifier, detect the object a user wants to find within an environment. It built a cloud API through which the app fetches further information about the object caught in the picture. A reinforcement learning-based AI model will be incorporated to improve predictions with time while training. Using a Neural Network based classifier helps to choose the right direction to take at every frame as recorded from the back camera of an Android device. Users can use a voice-operated dictionary, and artificial intelligence can translate much better, even in a full sentence. Detecting objects is the most significant part of our project. Object detection helps blind users to know about their current environment. Multi-Class Object Detection on Mobile Live-Video Stream using Deep Learning Convnets to assist the Visually Challenged or to signal an incoming threat.

Keywords: Object detection, Neural Network, AI, Deep learning, Blind people.

I. INTRODUCTION

The system presents unique navigation with assistance from the only AI a blind person will ever need. Object Detection Using sophisticated object detection algorithms implemented from scratch on a Tensorflow library on a native Android device by incorporating a trained classifier can detect the object a user wants to find within an environment. We further built a cloud API through which the app fetches further information about the thing as caught in the picture. A reinforcement learning-based AI model is to be incorporated to improve predictions with time while training.

II.LITERATURE SURVEY

This Survey shows a Literature review :

1- Real-Time Objects Recognition Approach for Assisting Blind People.

[Jamal S. Zraqou Wissam M. Alkhadour and Mohammad Z. Siam, Multimedia Systems Department, Electrical Engineering Department, Isra University, Amman-Jordan Accepted 30 Jan 2017, Available online 31 Jan 2017, Vol.7, No.1]

Blind assistance promotes a wide challenge in computer vision, such as navigation and path finding. In this paper, two cameras placed on blind person's glasses, GPS-free service, and an ultra-sonic sensor are employed to provide. the necessary information about the surrounding environment. A dataset of objects gathered from daily scenes is created to apply the required recognition. Object detection is used to find objects in the real world from an image of the world, such as faces, bicycles, chairs, doors, or tables, that are common in the scenes of a blind.

The two cameras are necessary to generate the depth by creating the disparity map of the scene, GPS service is used to create groups of objects based on their locations, and the sensor detects any obstacle at a medium to long distance. The descriptor of the Speeded-Up Robust Features method is optimized to perform the recognition. The proposed method for the blind aims at expanding possibilities for people with vision loss to achieve their full potential. The experimental results reveal the performance of the proposed work in about real-time system.

2-Voscal vision for visually impaired

[The International Journal Of Issn: 2319 – 1813 Isbn: 2319 – 1805 Engineering And Science(Ijes)-01-07||2013|| Shrilekha Banger, Preetam Narkhede, Rajashree Parajape.]

This project is a vision substitute system designed to assist blind people in autonomous navigation. Its working concept is based on ‘image to sound’ conversion. The vision sensor captures the image in front of the blind user. This image is then fed to MATLAB for processing. Process Intuit processes the captured image and enhances the significant vision data. This processed image is then compared with the database kept in the microcontroller. The processed

information is then presented as a structured form of the acoustic signal and is conveyed to the blind user using a set of earphones. Color information from the interested objects evaluated to determine the object's color. The color output is informed to the blind user through headphones.

3-Object Detection Combining Recognition and Segmentation

[Fudan University, Shanghai, PRC, yfshen@fudan.edu.cn University of Pennsylvania,3330WalnutStreet, Philadelphia, PA19104 Liming Wang1, Jianbo Shi2, Gang Song2, and I-fan Shen.]

This project develop an object detection method combining top-down recognition with apptom-up image segmentation. There are two main steps in this method: a hypothesis generation step and a verification step. In the top-down hypothesis generation step, design an improved Shape Context feature, which is more robust to object deformation and background clutter. The improved Shape Context is used to generate a set of hypotheses of object locations and figure ground masks, which have high recall and low precision rate. In the verification step, first compute a set of feasible segmentations that are consistent with top-down object hypotheses, then it propose a False Positive Pruning(FPP) procedure to prune out false positives. It can exploit the fact that false positive regions typically do not align with any feasible image segmentation. Experiments show that this simple framework is capable of achieving app high recall and high precision with only a few positive training examples and that this method can be generalized to many object classes.

4 - Microsoft COCO Common Objects in Context

[Tsung-Yi Lin, Michael Maire, Serge Belongie, Lubomir Bourdev, Ross Girshick, James Hays, Pietro Perona, Deva Ramanan, C. Lawrence Zitnick, Piotr Dollár(Submitted on 1 May 2014 (v1), last revised 21 Feb 2015 (this version, v3))]

This project present a new dataset with the goal of advancing the state-of-the-art in object recognition by placing the question of object recognition in the context of the broader question of scene understanding. This is achieved by gathering images of complex everyday scenes containing common objects in their natural context. Objects are labeled using per-instance segmentations to aid in precise object localization. It present a detailed statistical analysis of the dataset in comparison to PASCAL, ImageNet, and SUN. Finally, we provide baseline performance analysis for bounding box and segmentation detection results using a Deformable Parts Model.

III. METHODOLGY

MODULE DESCRIPTION

- **Data Generation:** Gather images of similar objects.
- **Image Annotation:** Label the objects with bounding box.
- **API Installation:** Install TensorFlow Object Detection API.

- **Train & Validate Model:** Using annotated images.
- **Freeze the Model:** To enable mobile deployment.
- **Deploy and Run:** In mobile or virtual environment.
- **Voice communication**

Data Generation

The video thus created becomes the test data. Now extract some frames from created video using Video to JPG Converter. The extracted frames and saved images from Google are batches processed to make the filenames consistent and image dimensions similar, which becomes the train data.

Image Annotation

This step has the train and test images. But the exact location and object type in the images must be explicitly labeled. Using the MobileNet model for the neural network architecture and Single Shot Detection to locate the bounding boxes. To install TensorFlow Object Detection API, corresponding libraries are installed in the Android manifestation file.

Train & Validate Model

Download the pre-trained Mobileset SSD model from here and retrain it with your dataset to replace the classes as you desire. Re-training is done to reduce the training time. Once the environment variable is set, execute the train.py file with a config parameter.

Freeze the Model

The graph and its weights only need to serve as a model in production. TensorFlow has a built-in helper function to extract what is needed for inference and create frozen graph_def. To export the graph for inference, use the latest checkpoint file number in the "data" folder. The frozen model file, frozen_inference_graph.pb is generated inside the output directory to be deployed on mobile.

Deploy and Run

Update the tensorflow/WORKSPACE file in the root directory with the API level and location of the SDK and NDK. Build the bundle as an APK file using Android Studio. Locate the APK file and install it on your Android mobile. Execute the TensorFlow-Detect app to start object detection. The camera would turn on and detect objects in real-time.

Voice communication

Project's goal was to develop a mobile application that aimed to unravel and simplify the day-to-day complications faced by a visually impaired individual and assist an aware individual. The original idea came from Cortana, Siri, and other Artificial Intelligence. The only way a visually impaired person can communicate is via VOICE, keeping that in mind, we implemented an intelligent voice recognition assistant for Android where functionality for an individual's day-to-day chores is simplified.

This module opens following through voice:

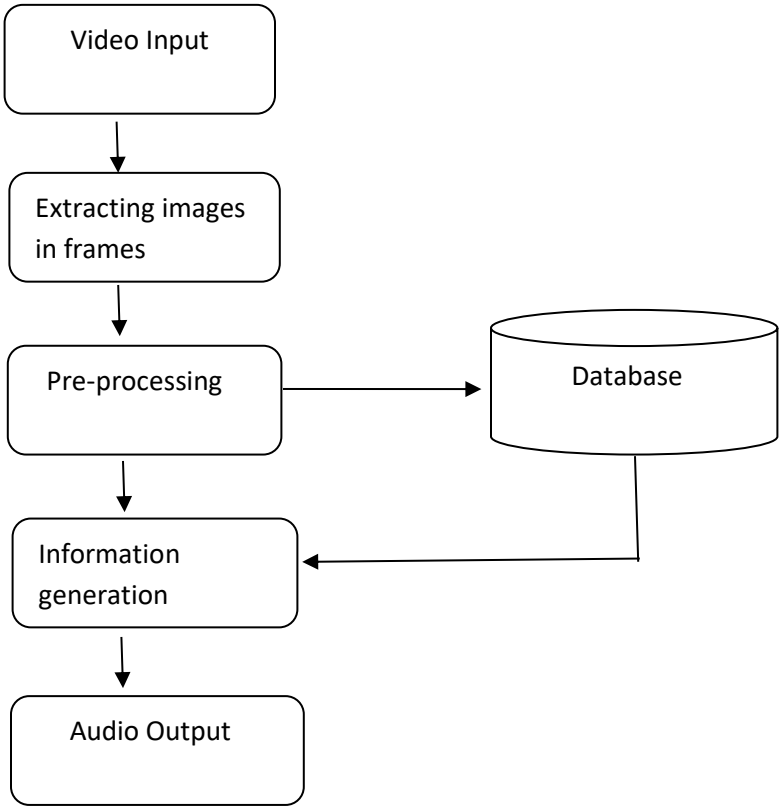
- Calling services
- Text message exchange
- Mail exchange and search
- Alarm
- Event handle
- Location services
- Music player service
- Contacts and call logs
- Checking weather
- Emergency,
- Making notes
- Google searching engine
- Date/ Time
- Help menu

Features:

- It has become the best method in solving image classification problems in visual recognition and object detection.
- The ML object detection model that allows for a properly trained network to respond correctly.
- It is fast in object recognition.

- System uses Android mobile thus eliminating need of special hardware devices.
- Notification send through voice and message delivered in audio format.
- Contact calling is also done through this application.

ARCHITECTURE DIAGRAM:



[Figure-1]

IV. RESULTS AND DISCUSSION

The object detection and recognition development, the classifier training accuracy analysis is a must step to ensure the application provides high accuracy percentage. The application is designed with a simple interface to make it user-friendly for the visually impaired. An assistive mobile application to help make the world more accessible to visually impaired people, which uses a deep learning approach to process images from the phone's camera to do image classification b. This application can give fast and more accurate results because it uses on-device image recognition from deep learning approach c. As it uses on-device image

recognition, no internet connection is required. So the user can use the application anywhere and anytime

V. CONCLUSION

The proposed system is a simple, economical guidance system that provides constructive assistance and support for blind and visually impaired persons. The results show that a system is appreciated and unique in identifying the object that the blind person may encounter. It also resourcesforo mobility-oriented problems that influence blind people in their environment. The future scope of the project determines to recognize multiple objects in a view with better accuracy and less detection. The extension of the system identifies any entity with faster frame rate. The model can be trained to recognize objects which arly encounted by the uencountered, it can be customized for the specific needs of the user and ensure for navigation.

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