

IMPLEMENTATION ON NAVIGATION AND CAMERA READING SYSTEM FOR VISUALLY IMPAIRED

Anusha K V¹, Devika K M², Shrinidhi C Y³, Yashaswini M⁴, Dr. Madhu B.K⁵.
^{1,2,3,4} students, Dept. of Computer Science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, India.
⁵ Professor, Dept. of Computer Science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, India

Abstract: Today, many of the aid systems deployed for visually impaired people are mostly made for a single purpose. Be it navigation, object detection, or distance perceiving. Also, most of the deployed aid systems use indoor navigation which requires a pre-knowledge of the environment. These aid systems often fail to help visually impaired people in the unfamiliar scenario. In this paper, we propose an aid system developed using object detection and depth perceivment to navigate a person without dashing into an object. The prototype developed detects different types of objects and compute their distances from the user. We also, implemented a navigation feature to get input from the user about the target destination and hence, navigate the impaired person to his/her object destination. With this system, we built a multi-feature, high accuracy navigational aid system by processing the image and performing computation using image processing to help the visually impaired people in their daily life by navigating them effortlessly to their desired destination and to read the data from the image with the help of image processing.

Keywords: Optical Character Recognition (OCR), Text to Speech Synthesis (TTS) and Digital Image Processing (DIP).

1. INTRODUCTION

Computer vision (CV) is one of the many branches of computer science which is thriving to resemble human vision. It is not confined to capture an image from the camera as it also encapsulates an intelligent software module which is used for analyzing the image based on various algorithms for specific applications. These algorithms incorporate processing of image/s to determine the features and attributes which can describe the image at an abstract level. These features and attributes of an image provide meaningful inferences with respect to specific applications. This involvement of intelligent software module classifies CV as a category of science and it is growing to become a perfect artificial vision. However, computer vision is also trying to teach a system to pick what should be a zone of interest, how to understand the objects and how the machine should be thinking. Some of the applications of computer vision are monitoring industrial equipment, monitoring biological cells and some real-life applications like parking systems. The technological implementation of CV system is better than biological in

many ways like a camera can detect movements faster than the human eye. Due to this reason, CV has also found its deployment in the area of healthcare for visually impaired people. Navigation systems are one type of aid systems which help a person navigate in an unfamiliar environment smoothly without being lost or getting hurt. In an indoor navigation system, the system helps to navigate a person in an indoor controlled environment where the environment is usually fully observable. The main problem which an indoor navigation system faces is of the lack of precision which is due to the localization method used.

2. AIM

Aim of our project is to develop a concept of Navigation and Camera Reading System for people who in need, this concept is achieving by digital image processing and web camera. This mainly helps to the people who are visually impaired.

3. IMPLEMENTATION

Implementation is the procedure of changing over another or an updated machine graph into an operational one. The objective is to put the new or amended device that has been tested into activity while securing costs, risks, and private inflammation to the minimum. A basic part of the execution framework is to verify that there will be no upsetting the working of the organization. The high-quality approach for picking up oversee while embedding any new framework is utilize appropriately conscious test for evaluating every single new program. Before creation reports are utilized to test stay information, printed content documents ought to be made on the old framework, replicated over to the new framework, and utilized for the starter check of each program. Another viewpoint to be regarded in the implementation stage is the securing of the hardware and software. When the product is created for the device and testing is done, it is then the technique for making the recently planned framework totally operational and steady in execution.

Implementation is the most crucial stage in arriving at a productive device and giving the user's self-conviction that the new system is serviceable and successful. Execution of an adjusted programming to trade a present one. This kind of discussion is entirely helpful to deal with, gracefully there are no overwhelming changes in the system.

A. System Implementation

There are three essential sorts of implementation are there anyway coming up next are proposed for the project. Following is the algorithm we are going to use in this project. ANN

Algorithm.

B. Parallel Conversion Type Implementation

In this type of implementation both the present-day system and the proposed system run in parallel. This happens till the user receives the whole self-belief on the proposed device and consequently cuts of the cutting-edge system.

Phase - In Method of Implementation

In this kind of implementation, the proposed machine is brought phase-by-phase. This reduces the hazard of uncertainty of proposed system.

Each program is analysed independently at the time of improvement the utilization of the facts and has affirmed that this software linked collectively in the way distinct in the applications specification, the laptop machine and its environmental factors is inspected as per the general inclination of the user. The device that has been created is typical and end up being decent for the user. Thus, the device will be actualized very soon. A simple running system is secured with the goal that the individual can perceive the unique highlights truly and rapidly.

At first as an initial step the executable structure of the software is to be made and loaded in the regular server desktop which is helpful to the consumer and the server is to be identified with a system. The last stage is to document the whole system which gives components and the working methods of the system.

Implementation is the phase of the task when the hypothetical arrangement is got out into a working system. Along these lines it tends to be respected to be the most basic stage in accomplishing a fruitful new device and in giving the user, certainty that the new system will work and be successful.

The implementation stage incorporates mindful arranging, examination of the present machine and its constraints on implementation, planning of systems to acquire changeover and assessment of changeover strategies.

Implementation is the method of changing over another device plan into operation. The area centres around individual preparing, site practice and file conversion for installing a candidate system. The significant thing that must be seen directly here is that the transformation should now not upset the working of the association.

C. Implementation Methodology of the Project

The undertaking is applied in modular approach. Each module is coded as per the requirements and examined and this method is iterated till the all the modules have been completely implemented.

Modules

➤ Frame Extraction
Key Frame extraction is the method of extracting frame or set of frames that have a good representation of a shot. It should retain the salient feature of the shot, whilst eliminates most of the repeated frames.

➤ Object detection

Object detection is a pc imaginative and prescient method for finding instances of objects in fix or videos. Object detection algorithms normally leverage desktop mastering or deep mastering to produce meaningful results. In this module, it will discover the object from extracted frames.

- Comparison
In this fragment, it will compare each object with educated dataset.
- Frame axis Coordinator
It is used for Position and navigation. coordinates are used often in navigation as the vacation spot or path of journey can be given as a perspective and distance from the object being considered.

4. INPUT DESIGN

In a statistics system, enter is the uncooked records that is prepared to deliver yield. During the info plan, the engineers need to consider the input devices, for example, PC, MICR, OMR, and so on.

Accordingly, the awesome of system enter decides the first-class system output. All around structured input forms and screens have following houses –

- It has to fill explicit need successfully, for example, storing, recording, and recovering the data.
- It guarantees ideal completion with exactness.
- It must be anything but not difficult to fill and direct.
- It should point of convergence on user's consideration, consistency, and straightforwardness. Every one of these objectives are purchased utilizing the information on essential sketch norms in regards to –
 - What are the information sources required for the system?
 - How quit users answer to exceptional components of varieties and screens.

A. Objectives for Input Design

The targets of input outline are –

- To diagram fact and input methodology
- To decrease enter volume
- To arrange source documents for facts, seize or devise various insights hold onto techniques
- To diagram enter data records, facts section screens, individual interface screens, and so on.
- To utilize approval checks and advance pleasant enter controls.

B. Data Input Methods

A device should keep individual from committing errors by methods for –

- Clear shape plan with the guide of going out for composing neatly.
- Clear rules to fill form.
- Clear form plan.
- Reducing key strokes.
- Immediate mistake input.

A portion of the popular records input strategies are –

- Batch enter approach (Offline records enter technique)

- Online facts input technique
- Computer intelligible structures
- Interactive insights input

C. Input Integrity Controls

Input integrity controls incorporate a scope of systems to push off normal information blunders by means of end-users.

5. OUTPUT DESIGN

The sketch of output is the most important project of any framework. During output plan, engineers become mindful of the sort of outputs required, and consider the basic output controls and model record designs.

A. Targets of Output Design

The targets of input configuration are –

- To help output design that serves the supposed motive and disposes of the assembling of unfortunate output.
- To build up the output plan that meets the quit users' prerequisites.
- To gracefully the brilliant volume of output.
- To shape the output in dynamite structure and direct it to the correct individual.
- To make the output available on schedule for settling on exact choices.

Release us now by means of a number of sorts of outputs

– 1) External Outputs

Producers make and plan outside outputs for printers. Outer outputs empower the framework to withdraw the trigger proceeds onward the period of their beneficiaries or confirm developments to their beneficiaries.

A portion of the outer outputs are planned as turnaround outputs, which are applied as a structure and return the gadget as an input.

2) Internal outputs

Interior outputs are present inside the framework, and utilized with the guide of end-users and supervisors. They help the administration in choice creation and revealing.

There are three sorts of reports created by methods for organization data –

• **Detailed Reports** – They contain present data which has practically no sifting or limit created to help organization arranging and control.

• **Summary Reports** – They contain attributes and potential issues which are grouped and summed up that are created for administrators who do now not need details.

• **Exception Reports** – They contain special cases, separated records to some condition or popular before bestowing it to the director, as data.

3) Output Integrity Controls

Output integrity controls include directing codes to select the getting framework, and confirmation messages to check

effective receipt of messages that are treated by methods for network convention.

Printed or screen-design reports need to incorporate a date/time

for record printing and the information. Multipage audits contain record title or portrayal, and pagination. Pre-printed types normally incorporate a model variety and excellent date.

6. FORM DESIGN

The two structures and reports are the result of enter and output graph and are undertaking report comprising of specific information. The significant qualification is that varieties supply fields for realities enter yet reports are absolutely utilized for perusing. For example, request structures, work and credit application, and so on

- During shape planning, the designers should understand –
 - who will utilize them?
 - where might they be delivered
 - the reason for the structure or report

• During structure configuration, mechanized design apparatuses improve the engineer's capacity to model kinds and surveys and existing them to stop clients for evaluation.

A. Objectives of Good Form Design

A right structure sketch is necessary to ensure the following-

- To safeguard the presentation basic with the guide of giving material succession, data, and clear inscriptions.
- To meet the expected reason by method for the use of appropriate structures.
- To guarantee the fulfillment of shape with exactness.
- To hold the types of spellbinding by method for the use of symbols, backwards video, or blinking cursors and so on.
- To encourage navigation.

B. Types of Forms

1.level Forms

- It is a single copy shape composed physically or by methods in desktop and imprinted on a paper. For extra duplicates of the first, carbon papers are embedded between duplicates.
- It is an easiest and more affordable shape to configuration, print, and recreate, which utilizes substantially less volume.

2. Unit Set/Snap out Forms

- These are papers with one-time carbons interleaved into unit units for either written by hand or desktop use.
- Carbons may also be both blue or dark, standard grade medium power. For the most part, blue carbons are decent for manually written sorts while dark carbons are wonderful for computer use.

3. Constant strip/Fanfold Forms

- These are numerous unit varieties participated in a persistent strip with holes between each pair of structures.
- It is a less costly procedure for enormous volume use.

4. No Carbon Required (NCR) Paper

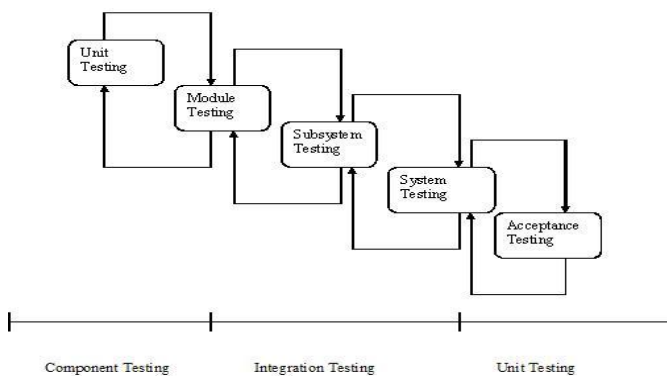
- They utilize carbonless papers which have two chemical coatings (capsules), one on the face and the other on the again of a piece of paper.

- At the point when stress is applied, the two tablets cooperate and make a picture.

7. TESTING

Testing is the major process involved in software quality assurance (QA). It is iterative process. Here test data is prepared and is used to test the modules individually. System testing makes sure that all components of the system function properly as a unit by actually forcing the system to fail. The test causes should be planned before testing begins. Then as the testing progresses, testing shifts focus in an attempt to find errors in integrated clusters of modules and in the entire system. The philosophy behind testing is to find errors. Actually, testing is the estate of implementation that is aimed at ensuring that the system works actually and efficiently before implementation. Testing is done for each module. After testing all the modules, the modules are integrated and testing of the final system is done with the test data, specially designed to show that the system will operate successfully in all its aspects conditions. The procedure level testing is made first. By giving improper inputs, the errors occurred are noted and eliminated. Thus, the system testing is a confirmation that all is correct and an opportunity to show the user that the system works. The final step involves Validation testing, which determines whether the software function as the user expected. The end-user rather than the system developer conduct this test most software developers as a process called “Alpha and Beta test” to uncover that only the end user seems able to find. This is the final step in system life cycle. Here we implement the Tested error-free system into real-life environment and make necessary changes, which runs in an online fashion. Here system maintenance is done every months or year based on company policies, and is checked for errors like runtime errors, long run errors and other maintenances like table verification and reports. During the requirement analysis and design, the output is a document that is usually textual and non-executable.

After the coding phase, computer programs are available that can be executed for testing purpose. This implies that testing not only has to uncover errors introduced during coding, but also errors introduced during the previous phases.



The various types of testing done on the system are:

- Unit Testing
- Integration Testing
- Validation Testing
- System Testing
- Acceptance Testing

A. UNIT TESTING

Unit testing verification efforts on the smallest unit of software design, module. This is known as “Module Testing”. The modules are tested separately. This testing is carried out during programming stage itself. In these testing steps, each module is found to be working satisfactorily as regard to the expected output from the module.

B. INTEGRATION TESTING

Integration testing is a systematic technique for constructing tests to uncover error associated within the interface. In the project, all the modules are combined and then the entire program is tested as a whole. In the integration-testing step, all the error uncovered is corrected for the next testing steps.

C. VALIDATION TESTING

To uncover functional errors, that is, to check whether functional characteristics confirm to specification or not specified.

D. SYSTEM TESTING

Once individual module testing completed, modules are assembled to perform as a system. Then the top down testing, which begins from upper level to lower level module testing, has to be done to check whether the entire system is performing satisfactorily. After unit and integration testing is over then the system as whole is tested.

There are two general strategies for system testing.

They are:

- Code Testing
- Specification Testing

Code testing

This strategy examines the logic of the program. A path is a specific combination of conditions handled by the program. Using this strategy, every path through the program is tested.

Specification Testing

This strategy examines the specifications stating what the program should do and how it should perform under various conditions. The test cases are developed for each condition of developed system and processed. It is found that the system developed perform according to its specified requirements. The system is used experimentally to ensure that the software will run according to its specification and in the way user expect. Specification Testing is done

successfully by entering various types of end data. It is checked for both valid and invalid data and found System is working properly as per requirement.

E. ACCEPTANCE TESTING

When the system has no measure problem with its accuracy, the system passes through a final acceptance test. This test confirms that the system needs the original

Test Plan

A software project test plan is a document that describes the objectives, scope approach and focus of a software testing effort. This process of preparing a test plan is a useful way to think through the efforts needed to validate the acceptability of a software product. The completed document will help the people outside the test group understand „Why and How“ of production validation. Different test plans are used at different levels of testing.

Test Plans used in Unit Testing

Each module is tested for correctness whether it is meeting all the expected results. Condition loops in the code are properly terminated so that they don't enter into an infinite loop. Proper validations are done so as to avoid any errors related to data entry from user.

F. TEST CASES

Testcase Number	Testing Scenario	Expected result	Result
	Upload Video		
TC -01	If there is fault in camera	Video is not loaded	Pass
Tc - 02	If there is no fault in camera	Video loaded is	Pass
	Frame Extraction		
TC-01	If video is not captured properly	Frames are not extracted	Pass
TC-02	If video is captured properly	Frames are extracted	Pass
	Object Detection		
Tc - 01	If video has clear	Object detection	Pass
TC -02	If any disturbance in frames	Object not detected	Pass
TC-03	If frame contain more than one object	Detect all the objects	Pass
	Comparison		
TC-01	Compare object with trained dataset	Display the object name	Pass
	Navigation		

TC-01	Position are clear	Navigate to user	Pass
TC-02	Object find	navigate	Pass

8. CONCLUSION

The system proposed here is a novel method for obstacle detection and identification. It can be easily commercialized and be made to benefit the visually impaired community. Unlike other existing models, it does not require a large database because of the pre-trained Cognitive Neural Network model. The Single Shot Detection Mobile Net model has been trained using the COCO dataset which contains almost 300 thousand images. Hence, it can recognize any object without needing a database. From the experiments it was concluded that the system works extremely accurate in identifying people. It has 21 MAPS (Mean Average Precision). Common place objects are also identified with satisfactory accuracy, provided they are sharply defined.

REFERENCES

- [1] Mekhalfi, M. L., Melgani, F., Bazi, Y., & Alajlan, N. (2015). A compressive sensing approach to describe indoor scenes for blind people. *IEEE Transactions on Circuits and Systems for Video Technology*, 25(6), 1245-1256.
- [2] Hub, A., Diepstraten, J., & Ertl, T. (2004, October). Design and development of an indoor navigation and object identification system for the blind. In *ACM Sigaccess Accessibility and Computing* (No. 66-68, pp. 146-152). ACM.
- [3] Yelamarthi, K., Haas, D., Nielsen, D., & Mothersell, S. (2010, August). RFID and GPS integrated navigation system for the visually impaired. In *Circuits and Systems (MWSCAS), 2010 53rd IEEE International Midwest Symposium on* (pp. 1149-1152). IEEE.
- [4] Prof. Seema Udgirkar, Shivaji Sarokar, Sujit Gore, Dinesh Kakuste, Suraj Chaskar, 2005, " Object Detection System for Blind People," *International Journal of Innovative Research in Computer and Communication Engineering. Recognition in Images and Multi-Object Detection," International Journal of Advanced Research in Computer Engineering & Technology.*
- [5] Payal Panchal, Gaurav Prajapati, Savan Patel, Hinal Shah and Jitendra Nasriwala, 2008, " A Review on Object Detection and Tracking Methods," *International Journal For Research In Emerging Science And Technology.*