Introduction of Human Assistance in Self-Driving Car

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Abstract

An Autonomous car is also called as self-drive car or driverless car or robotic car whatever the name but the aim of the technology is same. From the past few years, updating automation technology day by day and using all aspects in regular human life. The present scenery of human being is addicted to automation and machine learning technology like medical, transportation and in IT sector. For the last 10 years the Automobile industry came forward to researching autonomous vehicle technology (Tesla, Uber, Google, Volvo, Audi and Renault). Everyday autonomous technology researches are solving challenges. In the future without human help there will be a human assistance using artificial intelligence technology based on requirement and prefer this vehicle are very safe and comfortable in emergency.

Keywords: Machine learning, Self-Drive Cars, Human Assistance, Artificial intelligence, Intersection Over

1. INTRODUCTION

Self-driving cars use protection systems to identify obstacles and stop-offs in some high-tech cars, but none of them are completely driverless. The automation feature of active cars is insufficient to allow cars to drive itself. There is a constant need for drivers in car without it the car is out of reach. But with the help of self-driving cars, we can constantly make the presence of cars on the road. The Driver constantly needs to examine signals, road safety signs, barriers, and lanes for traditional cars and make decisions respectively.

The point of AI fundamentally assists us with understanding the construction of information and fit that information into models that can be perceived and used by people. It is the interaction where we get the PCs to program themselves utilizing man-made reasoning. Fundamentally in Traditional Programming we run the information and program on the PC to deliver the yield yet on account of Machine Learning we run the information and yield on the PC to make a program. Some of the key elements of machine learning are [I] Representation: This element mainly focuses on how to represent the data so that its key qualities can be provided to the model with a useful vantage point. [II] Evaluation: The basic function of this element is to evaluate the performance of a machine learning model so that we can estimate the generalisation accuracy of the future data. [III] Optimization: It basically refers to all the methods and techniques that are used in designing the machine learning model. [1] Now a days machine learning is used in various professions and industries to make the jobs simpler and easier, some of the real-world examples of them are Product Recommendations: This feature is currently present in almost each and every e-commerce website. Using machine learning these websites track the user behaviours based on the previous purchases, cart history, searching pattern, and makes the product recommendation to the user.

(i)   **Features of Machine Learning:**

    a. **Eye/Face recognition**: This feature of machine learning is used in various mobiles and computers as a medium of security for the data of users. In this the retina/face of the user is scanned and saved and next time when the user accesses the device it can match the image scanned and provide the accessibility to the user.

    b. **Automating employee access control:** This feature of machine learning is implemented in various organizations to determine the level of access that would be needed in various areas by the employees depending on their job profile.

    c. **Social media platforms:** Various social media platforms use the concept of machine learning to create some exciting and user-friendly features.

    d. **Language Translation**: One of the most useful feature of machine learning is language translation. This feature helps the user by converting the words and sentences written in some other languages into the language that can be read as well as understood by the user.

e. **Prediction:** This feature of machine learning helps the user to find what could be the possible future result of a situation based on the previous scenarios and the current demands.

(ii)   **Types of Machine Learning:**

a. **Supervised Learning**: It is the learning in which we train the models using the labelled datasets and it is also the most mature and most studied type of learning. For example, it can detect which credit card transactions are likely to be spam or which insurance customer is likely to make a claim. In the case of fraud, you know some transactions are fraudulent but are not in your training data. The learning algorithm receives a set of inputs side by side with the corresponding correct outputs, and the algorithm learns by comparing its actual output with the correct outputs so it can find errors and modify the model accordingly.[2]

b. **Unsupervised Learning**: It is the learning in which we train the models using the unlabelled datasets. Suppose the unsupervised learning algorithm is given an input dataset containing images of various types of cats and dogs. The algorithm is never trained as per given dataset, which means it does not have any idea about the features of the dataset. The task of the unsupervised learning algorithm is to identify the image features by itself. Unsupervised learning algorithm will complete the assigned task by clustering the image dataset into the groups according to similarities between images.[3]

c. **Semi-supervised Learning**: Basically, it is a combination of both the Supervised and Unsupervised learning.

d. **Reinforcement learning:** In this learning we focus on how to take suitable action so that we can maximize the rewards in a particular situation. For example, after watching a video on YouTube, the platform will show you same content that you believe you will like. However, suppose you start watching the recommended video and do not finish it. In that case, the machine will understand that the recommended video was not a good one and will try another approach next time.[4]

(iii)   **Types of Radar**

Radar is an object detection system that uses radio waves to determine the distance, angle, or velocity. It can be used to detect any object like aircraft, ships, spacecraft, guided missiles, motor vehicles, weather formations.

a. **Short Range Radar** - Mainly first steps in the new and evolving safety technology. Upcoming generation vehicles will additionally adopt the near-range environment system into consideration. Short range radar is thus expected to be the key enabling technology. Short Range Radar sensors around the car acts as a "virtual safety belt" allowing to analyse the several safety and support functions, such as crash warning, Pre-crash sensing, preconditioning of restraints and airbags, Lane change aid, Stop & follow, Stop & roll, Recognition of Traffic members, Blind spot detection, parking aid and depending on the required reliability Pedestrian compliance.[5]

b. **Long Range Radar** - LRR4 is a monostatic multimodal radar that has six fixed radar antennae. The middle four antennae feature optimum characteristics for recording the vehicle's around at higher speeds. They create a focused beam pattern with an angle of ±6 degrees, providing excellent long-range detection with minimal interference from traffic in adjacent lanes.[6]
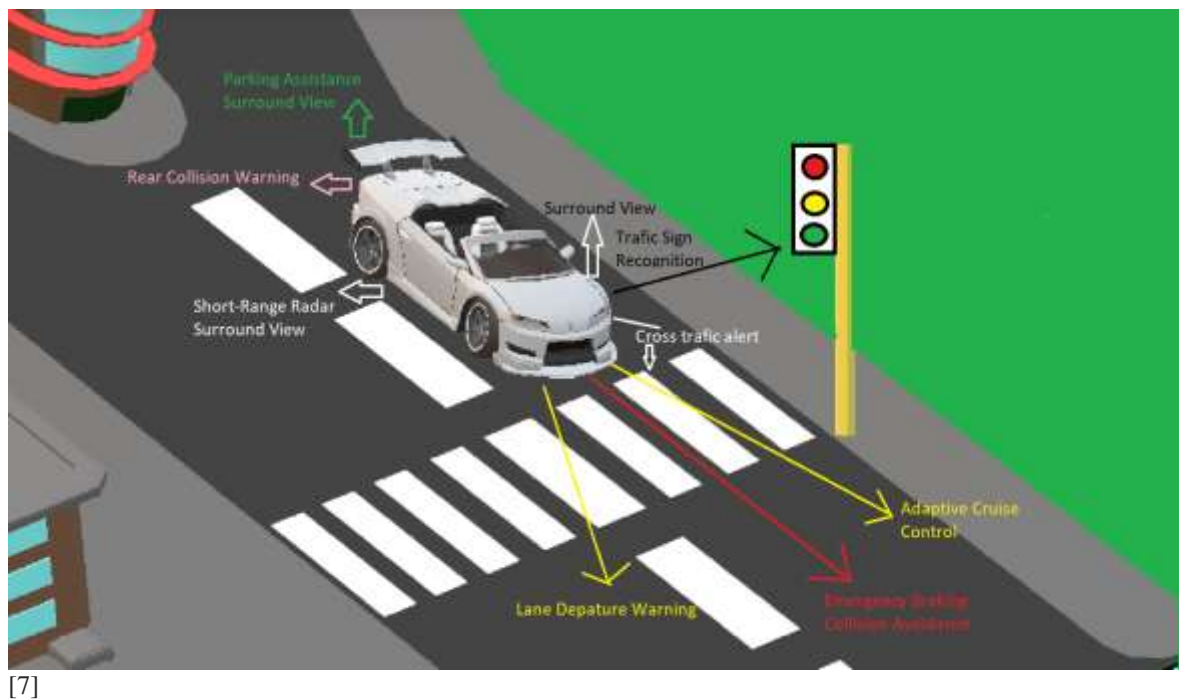
[7]

Figure -1 Working of Self Driven Car

2. LITERATURE SURVEY

PAPER TITLE	WRITTEN BY	ABSTRACT	DRAWBACK
Short Range Radar (SRR) -System for Automotive Applications	Gerhard Rollmann, Volker Schmid, Moheb Mekhaiel	1.Increasing car accidents due to heavy traffic. 2.Implementing EU approach to Road Safety and Intelligent Transport systems 3.Industry response to EU	1.High Technology vehicle and expensive to afford for all. 2.Safety and Security concern 3.Non-functional sensors
Statistics and machine learning at scale	Wayne Thompson	1.Integrated text analytics 2.Data exploration, feature engineering and dimension reduction 3.Model development with modern statistical, data mining and machine learning algorithms	1.High error susceptibility 2.Interpretation of results 3. Data acquisition

Self-Driving Car Using Machine Learning	Tej Kurani1, Nidhip Kathiriya2, Uday Mistry3, Prof. Lukesh Kadu4, Prof. Harish Motekar5	1.Invention of a car with no human input. 2.Use of neutral network for car automation. 3.Responding and making decision	1.Prone to hacking 2. Autonomous driving can be dangerous
Artificial Intelligence (AI)	Jelena Frtunikj, Qing Rao	1.Deep learning-based approaches for autonomous driving. 2. Artificial Intelligence (AI) is revolutionizing the modern society.	1.Doesn't improve with experience. 2.Lack creativity.
THE YAN: [Self Driving Car Using Deep Learning]	Ms. Sujeetha1, Chitrak Bari2, Gareja Prdip3 , Siddhant Purohit4	1.Autonomous robotically handled driving vehicle 2. use of mapping, tracking and local planning. 3.It demonstrate proper parking allotment, lane changes, and automatic U-turns.	1.Potential technology to go wrong. 2.Potential for greater pollution 3.Loss of privacy.
Self-Driving and Driver Relaxing Vehicle	Qudsia Memon, Shahzeb Ali, Wajiha Shah, Muzamil Ahmed	Since 2010 the biggest network google has started new changes to give a whole new level to automated vehicle	1.Hacking 2.Most Expensive
Secure Group message transferring stegosystem	Bhatia, M. P. S., Bhatia, M. K., and Muttoo, S. K. .	International journal of information security and privacy, IGI global	
Secure group communication with hidden group key	Bhatia, M. K, Muttoo, S. K. and Bhatia, M. P. S (2013).	Information security journal: a global perspective, Taylor and Francis	
Implementing Ciphertext Policy Encryption in Cloud Platform for Patients' Health Information Based on the Attributes	Boopalan S., Ramkumar K., Ananthi N., Goswami P., Madan S.	Boopalan et al. proposed a method that explains the work on outlining and implementing patient-driven, patient health information in a cloud platform in light of	

		open-source Indivo X framework.	
Knight Tour for Image Steganography Technique	Bhatia, M. K.	proposed a message hiding technique, in this technique author used solutions of Knight tour and 8-Queen's problem in an 8*8 chessboard. The proposed technique applied solutions of moving knight tour and of placing 8-Queen's in non-attacking manner in 8*8 chessboard to select pixels for embedding secret message bits.	

Why Sequence of processing?

Object Detection compares variables to predict an object's position and distance

Object recognition helps in reducing the data set by finding patterns and commonalities. It also uses structures in data to organize the data into groups based on commonalities. Object recognition is done with the help of intersection over union. Figure-2 explain the process of IOU (intersection over union is used for measuring the accuracy of an object detector on a particular database). Intersection over Union is a development metric used to measure the correctness of an object detector on a particular database. We regularly see this developed metric used in object detection challenges like Pascal VOC challenge. Any algorithm that provides forecast bounding boxes as output can be judge using IOU.

A sensor is a device that is used for measuring physical input from the environment and converts the data such that can be interpreted by human or a machine. A sensor is a device that is used for measuring properties like pressure, position, temperature, or acceleration, and respond accordingly with feedback.
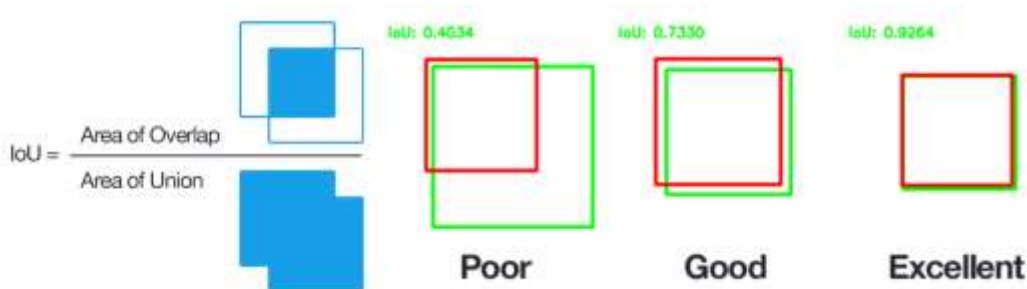

Figure -2 Intersection Over Union

Decision making uses multiple models to help recognize models to help recognize scenarios and make appropriate decisions.

Steps of Decision Making

Step 1: Identify the decision. You realize that you have to make a decision.
Step 2: Collect data.
Step 3: Identify the techniques.
Step 4: Consider the verification.
Step 5: Choose among techniques.

Step 6: Proceed accordingly.

Step 7: Review your Outcome & its significance.
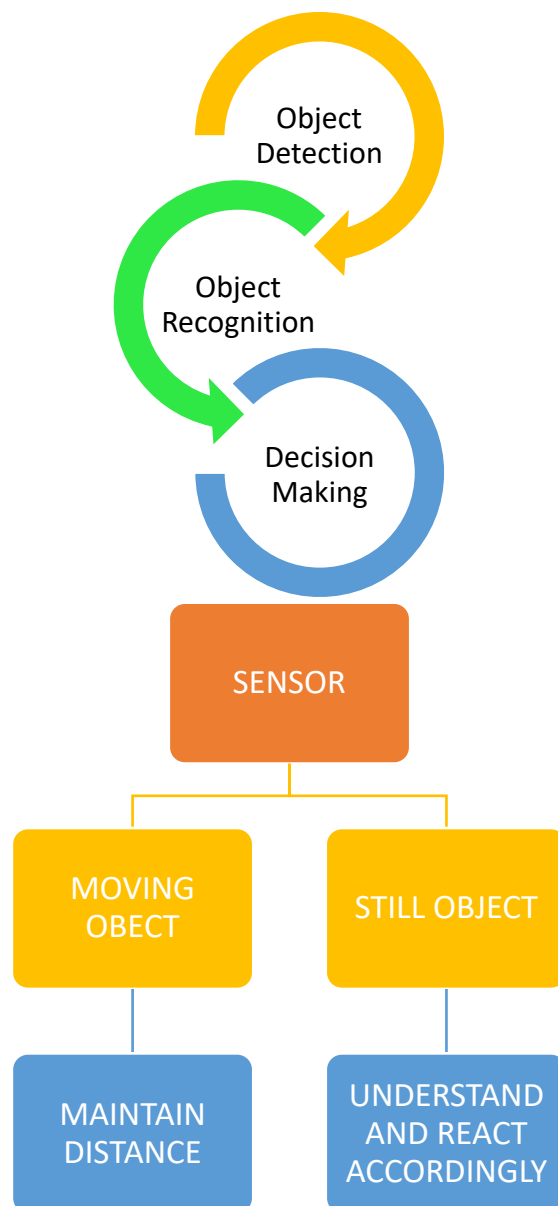
3.   REVIEW and ANALYSIS

We have analyzed many research papers so far and we have come across the different techniques and technologies which are used to develop the system in human assistance to stop a self-driving car for purpose of emergency needs. So we decided to create a function in which some symbols have been launched to resolve this problem. In this function a person can manually turn on or off according to their emergency needs.

We created this symbol for a person who is in need of HELP. The person has to stand near road side or put the symbol on the road so the self-drive car can capture the image and intersection over union which can match it with dataset and notify the person inside the car.

We created this symbol for a person who is in need of LIFT. The person has to stand near road side so the self-drive car can capture the image and intersection over union which can match it with the dataset and car can stop.

We created this symbol for Medical Emergency. The car will switch lane only if there is no other object in lane providing way to ambulance to pass.
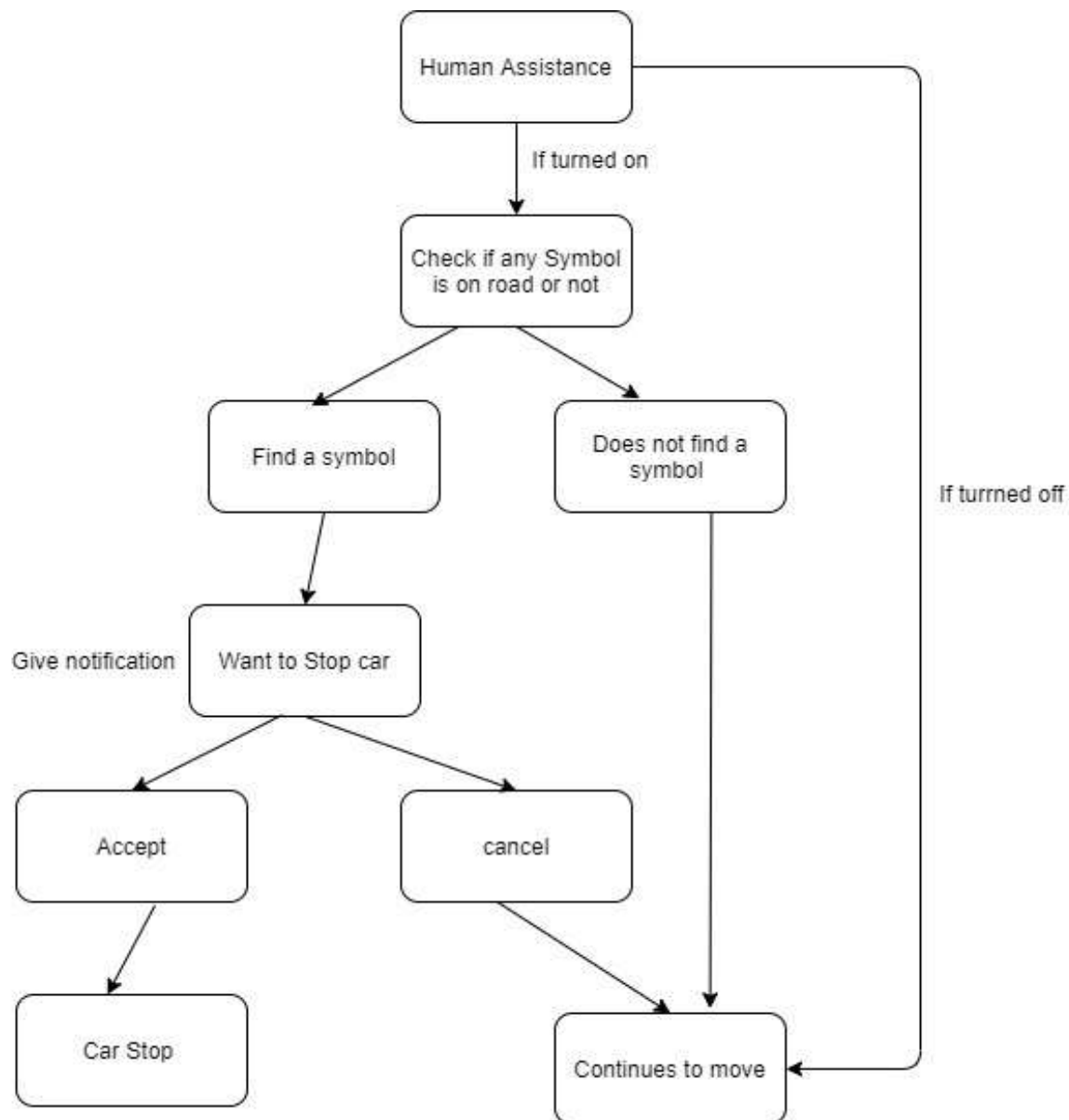

Fig:-3 Human Assistance

(i)   Proposed Steps

a. First the self-driving car will check if the human assistance function is turned on or not.

b. If the function is turned on then intersection over union will find the symbol is on the road.

c. If the symbol on the road gets detected and matches with the symbol in data set.

d. Then it will display a notification asking whether the human wants to help or not.

e. If the human accepts the notification, then the self-driven car will stop.

f. Else the car will continue to move.

(ii)   Proposed Function

a. Help function

Firstly, we will add some data in our dataset then the sensor will detect the object and check in the dataset. After checking the object, it will be recognized with the help of intersection over union. It will send an alert notification to the user that car has detected a help symbol and will wait for response from the user. If the user accepts the request from notification the car stops to provide help else the car continues to move if user declines the request from notification.
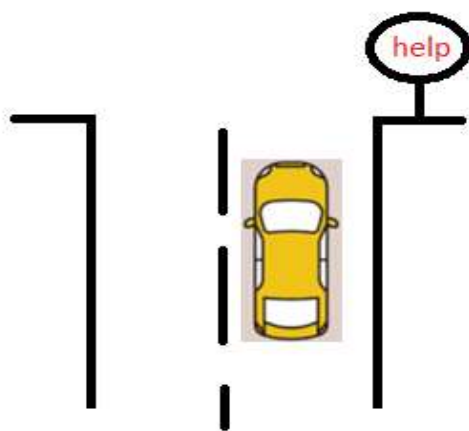

Figure - 4 Help sign

`   Figure:-5 Help action

Figure 4 and Figure 5 are the data provided by us in the data set which helps the car to recognize the action by the person in need of help.

b. Hitchhiking Function (lift)

We will add some data in our dataset so that the sensor will detect the object and check in the dataset. After checking the object, it will be recognized with the help of intersection over union. It will send an alert notification to the user that car has detected a lift symbol and will wait for response from the user. If the user

accepts the notification the car will stop to provide lift else car continues to move after the user declines the notification.

Fig- 6 Hitchhiking action

Fig - 7 Hitchhiking action

Figure 6 and Figure 7 are the data provided by us in the data set which will help car to recognize the action by the person in need of hitchhiking (lift).

c.   Medical Emergency

We will add some data in our dataset so that the sensor will detect the object and check in the dataset. After checking the alphabetic pattern, the self-driving car will able to detect emergency vehicles like ambulance. It will check the left lane if it is empty or there is no object it will move to side lane providing a way to ambulance to pass away. If there is no left lane then self-drive will reduce the speed of the car.
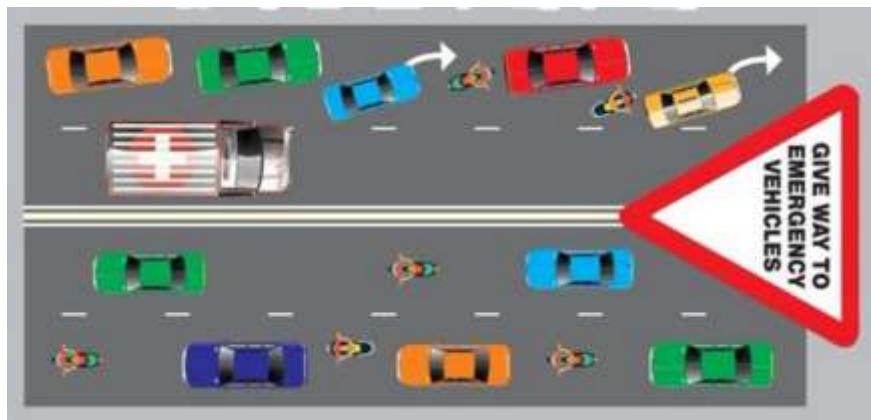
Fig 8 Symbol

Fig 9 Emergency vehicle

Figure 8 - the data provided by us in the data set which will help car to recognize the alphabetic pattern by which self-drive car use for giving way to emergency vehicles.

Figure 9 – It shows us the processing of self-driving car.

4. Conclusion

The Human assistance Model in self-driven car discussed in the paper provides a detailed information about how we can use human assistance System to get better functionality in self-driving cars. The human assistance system detects and recognizes every aspect of the symbols, sign and gives user notification accordingly. We have applied the formula of intersection over union in order to improve the functionality like medical emergency and helping function and hence proposed a human assistance model and algorithm. The Algorithm can be further used for developing the purpose system in future. Meanwhile the time needed to overcome the technological challenges must be used to design medical emergency and help functionality which will guarantee to improve the human assistance technology in next generation. Diagrammatical information tells the reader to get the better understanding of how the system works. The GUI provides an elaborate idea about how the system can look and how it is friendly to user making it very practical and feasible.

Reference

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