Human Robot Interaction

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Abstract: The HRI research field has advanced from past one – two decades. HRI is still relates to be among young community which aims towards Trans disciplinary, inventive and take in charge of scientific developments. This paper gives consideration to the "viola and jones algorithm" which helps to detect the face in the field of HRI

Keywords: HRI; Viola and Jones algorithm; Haar Features

I. INTRODUCTION

HRI is the area of study which deals with the human's nature and actions in regard to robotic machine which associates with substantial, mechanical and reactive quality of the robot, where it aims to develop transdisciplinary, inventive and take in charge of scientific developments that are simultaneously well structured in order to get a effective output.

Therefore, this paper deals with the "viola and jones algorithm" to detect face in the field of HRI. The face detection is essential feature for evolving machine to have a connection in an unpretentious manner. Detection of face is quite demanding because of change in vividness, inconstancy in taking measurements, locations, and arrangements with right attitude. It is easy for a human being to identify the face without any much struggle. Whereas constructing a robot for interactions with humans which possess the same characteristics as humans is quite challenging task. The challenge in face detection may include identifying the face in many shapes of the picture (which includes tress, cars, buildings etc.). Viola and jones algorithm is robust and its applications shows to be extraordinarily significant in detection of face at real-time.

II. METHODOLOGY

The Viola and Jones algorithm mainly includes four main steps and they are given below:

a) Selecting Haar-like features
b) Creating an integral image
c) Running AdaBoost training
d) Creating classifier cascades

The Haar features are order of rescaled quads and it is applicable to all parts of face for detection of human face in real-time. This quad shaped image consists of black and white pixels, the white represents value zero and the black represents the value one, for detection of eyebrow, lips and nose Haar features are used in different forms.

Fig 1. Haar-like Features

The extricating Haar-like features is necessary for face detection, it includes the process of calculation by summing the dark and light rectangular regions, therefore introduction of integral images to Haar-like features helps in reducing the time in order to complete the task quickly.
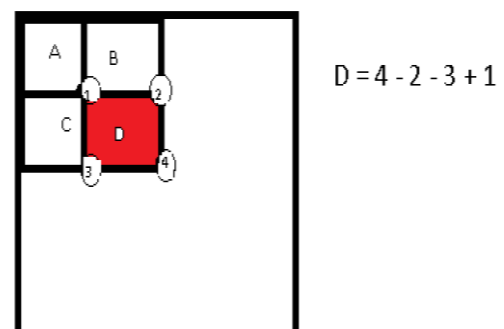

$$D = 4 - 2 - 3 + 1$$

Fig 2. Calculation of rectangular region by making use of integral image.

The Adaboost algorithm runs for N iterations, in each and every iteration the algorithm checks the error rate for all features and then chooses the feature with the smallest error rate.

In classifier cascades stage the input is accessed stage by stage. If face is given as input it accepts the input and proceeds and if face is not the input it do not accepts the input.

III. ADVANTAGES AND APPLICATION

HRI finds an impeccable place in our lives, as it performs the duties with utmost accuracy and precision. The wide spectrum has made its stands a potential player in the field of technology. Robotics has entered into almost all the field from the field of medicine to psychological counseling, from manufacturing of car to self-driving cars and many more. The improvisation in robotics has also improved standards of living and made life easy too. The success of HRI has made life of humans easier as can be as it can be assigned difficult works too, such as counter terrorist operations as it saves life.

A. Industrial robots

The role of robots in industry is to run the production process with more accuracy and cost effectively. Due to damages caused by human error, which decreases the production rate of the industry. Humans give the command and inspect the work done. This enhances the productivity of the company.

B. Military robots

The talk of the day is robots taking the role of military activities. This role has millions of questions asked as a lame man, can robots distinguish between friend and foe but the answer yes and technology has improved and so as the robotic psychology too. As now a days robots play an important role in the counter insurgency and also as drones too.

C. Domestic or household robots

Robots' entry in this field has shocked the human resource sector. As this sector was human resource driven but it's not far from true that robots will take up this sector too. Robotic pool cleaners, robotic sweepers and etc

D. Elder care robots

It help in nursing the elderly people how are unable to do the things on their own. As older people have weak psychological abilities to do things so they need constant monitoring.

E. Rehabilitation robots

These robots help people with stroke and other neurological problems as it can bring back the movement of the arm or legs such that the person who is bed ridden can start the movement.

F. Humanoid robots

These robots are designed for experimental purposes. Which are specialized in human and environment interactions and it is also meant for studying purpose. Example is Vyomithra.

IV. RESULTS

Robot machines are fast-moving in industrial area, and in numerous useful applications, therefore more hiring for job and business opportunities are beginning. optimistically a few years later these man-made machines or so called "device of homo-sapiens" will find its path along every walks of human life. There are tremendous job opportunities awaiting a candidate who has professional training in robotics engineering. The robotic field is upgrading day after day. The underlying problem and consequence are unaware to us as it is a grave concern, it is said that technology will improve but the improvement come with catastrophic effect on the human behavior and the environment too. The use of technology is in our hands and how we use it judiciously is also in our hands.

The future of robots are very optimistic, there certain areas such as military policing administration and many more areas where in robots can find its place too. For the betterment of the public and to bring transparency in the system.

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