

Robotic Hand in Harvesting Using Neural Networks and CMU Algorithm

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Abstract: Now- a- days in agriculture one of the major problem is Harvesting. Mainly the harvesting is being very difficult for the farmers. It will take long time to harvesting and there is a need for lot of man power and these days farmers are also facing workers scarcity. From all these we know one thing, we need to work without a human, that is machine and that machine needs to do work fast and efficient. In this work , we propose a machine which is used in harvesting of vegetables or fruits. The machine reduces the time duration and increases the efficiency in harvesting. The machine needs intelligence to manage all type of crops and different varieties in similar crops. So, we propose a system or machine called Robotic Hand. The Convolution Neural Networks (CNN) and Image AI Algorithms and CMU algorithms are used in the Robotic Hand for managing the intelligence in all types of crops like vegetables, Fruits etc. By using this Algorithm the time duration will be reduced and the efficiency will be increased in harvesting.

Keywords: Harvesting, Agriculture, Robotic, Convolution Neural Networks, CMU Algorithm;

1. Introduction

From years ago the agriculture is playing the major/important role in India. In India most of the areas are dependent on agriculture. In simple way we can say it is the day-to-day life to the people and it is the backbone of Indian economy.

Every year 14% of the overall GDP in India will be contributed from the agriculture only. In increasing of population the agriculture production should meet the increasing demands for food and bio-energy.

Harvesting plays a very important role in agriculture and this is being very difficult for the farmers, because the workers has to go to every plant and pluck the vegetables or fruits. In modern agriculture, practices are changing extensively. Idea comes from the problem, here in recent days there is very difficult to find workers to harvest crops in countries like India.

In the agriculture sector designing of machine for some crops is difficult, because the growing crop is may be different from various regions, may be there is difference in size of fruit/vegetable, height of a tree, color etc., these factors are very important , because in designing of machine these features will play a crucial role. Keeping this thing in mind to overcome all these problems in harvesting fruits/vegetables we design a machine called

robotic hand using Neural Networks and AI algorithms for functioning of the hand in harvesting fruits/vegetables.

The main objective of this work is to harvest fruits /vegetables using Neural Networks , AI algorithms.

The rest of the paper is organised as follows. In section 1 the survey/related work is explained and section 2 related work is explained.. The proposed method is presented in section 3. Section 4 represents the Design and working of the Robotic Hand and the conclusion of this work is provided in section 5.

2. Related Work

As I studied Robotic Hand in agriculture for harvesting fruits and vegetables in an article. As I am A Student of Computer Science and Engineering, by this article I have got this idea that we can use the Neural networks Algorithm i.e, Convolution Neural Networks for identifying and detecting the objects i.e, vegetables and fruits . And I have studied in google that many of them has used only single robotic hand for harvesting vegetables, from this I have used multiple hands for harvesting. When we are using multiple hands we will arise confusion in detecting objects, So to avoid this confusion I have used Central managing Algorithm..

3. Proposed Method

This Technique (or) an idea mainly concentrate on the crops like Tomato, chilli, etc., for this type of crops setting of machine is difficult. Because we know if the crop has only one time harvesting then we can cut the

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crop and then through various machines we can have the vegetables (or) fruits. But most of the cases regarding vegetables or fruits there is no single harvesting. So, in this method the machine has setting is based on human(How human eats ?). Here the machine has a mouth and number of hands. These hands will cut the vegetables or fruits and keep in the mouth. Here one question arises, How the hand will pluck the vegetable. We Humans can see the objects and recognize we can pluck that. So, here we need to recognize object before that it had visuals to see, we can do it using camera and that visuals can process using Neural Networks to detect the object.

After detection of objects next step is to move the hand towards the object. for this we assume the position of object is represented using x,y,z co-ordinates. After we know the position the hand should move towards the object. After hand is at the object, Now the hand sense the object and to hold that. There is also a light weight cutter with each hand.

After holding an object cutter cut the stem. Then after the hand keeps the object in the mouth of a machine. Similarly all the hands will do the same process. Here no hand is dependent on others. That means each hand has its own processing. Due to which we can overcome various problems like, if there is some problem in any hand then entire process will shutdown. If it was independent, then even one hand has got failure we can replace with other or we can just remove that hand.

In this case of in-dependency of hand operations there is a case which to take care. If there is a fruit and both hands recognize the same fruit, which may be different time or same, and distance is same or different, then both hands move towards the fruit. Before one hand, other hand plucks the fruit then, when other hand reach the coordinates there will be no fruit. Here the moving of one hand is said to be inefficient.

So we overcome this using one by Central Managing Unit. This Central Managing Unit decides whether the hand should move towards object or not. CMU get the coordinates of objects with respect to hands. CMU converts the all coordinates based on hand numbers. Then CMU process all coordinates and assign one unique coordinate to each hand. Here one question will arise.

What if the hand recognize multiple objects in visuals?

That means hand sends multiple coordinates of different objects to the CMU.

CMU algorithm is designed in a way each hand will get assigned a coordinate of object but all the hands should

have unique objects and all these objects assigned are near to the hands compare to other.

CMU algorithm:

Processing(target)

```
{
// load trained algorithm and parameters and
conditions from database db.
tf_model=db_connection.query(target=target)
//paramtrs and model load into hands
//Handling event requests
while(events)
{
if (pointer_event in target_coordinates)
{
set event to false
}
else if(pointer_event in target_reach)
{
set event to false
}
else
{
//store event coordinates in target fixed
}
}
event_status_change(e)
{
while(true)
{
if(event_pointer is change)
{
//send back request to hand either success
or failure
}
}
}
}
```

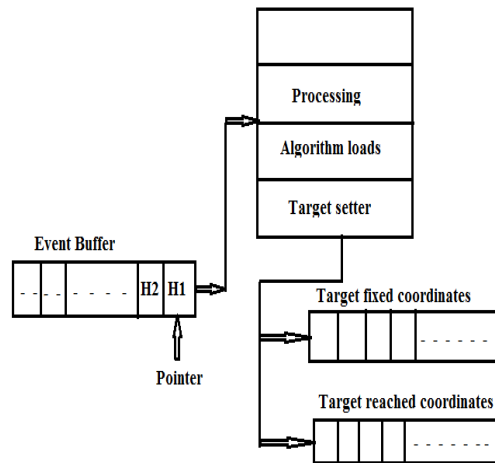


Fig. 1. Processing of CMU Algorithm.

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And other challenging factor is designing of hand. This machine is designed in the idea of large number of crops. Here the hand should not be too large in width. There are some trees which have vegetables surrounded by tree

leaves and branches. Then if our hand is large in width cutting is difficult and there will be breakage of stems, is possible if the tree is weak. And this hand is not like human hand(having one joint), but here it contains number of joints designed to increase the speed and efficiency.

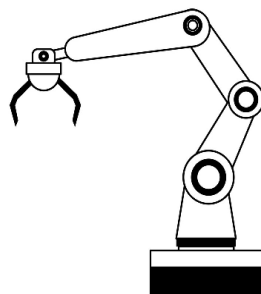


Fig. 2. Robotic Hand

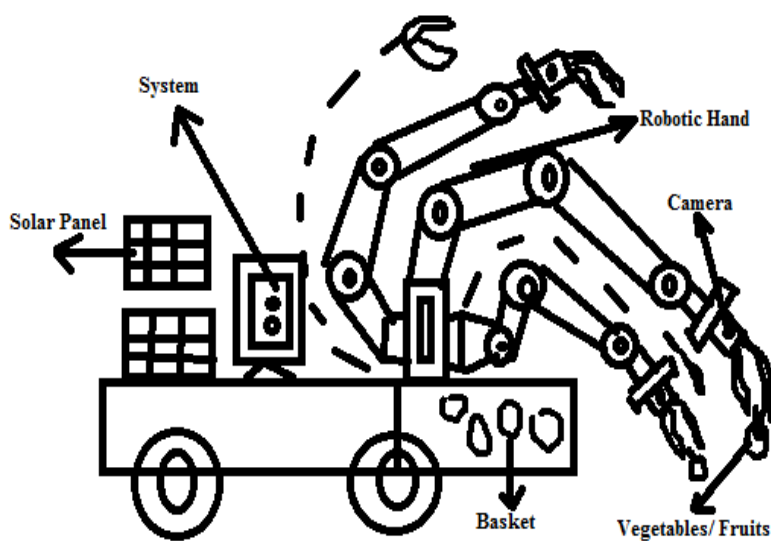


Fig. 3. Designing of Multiple robotic hand which are used in harvesting vegetables/fruits.

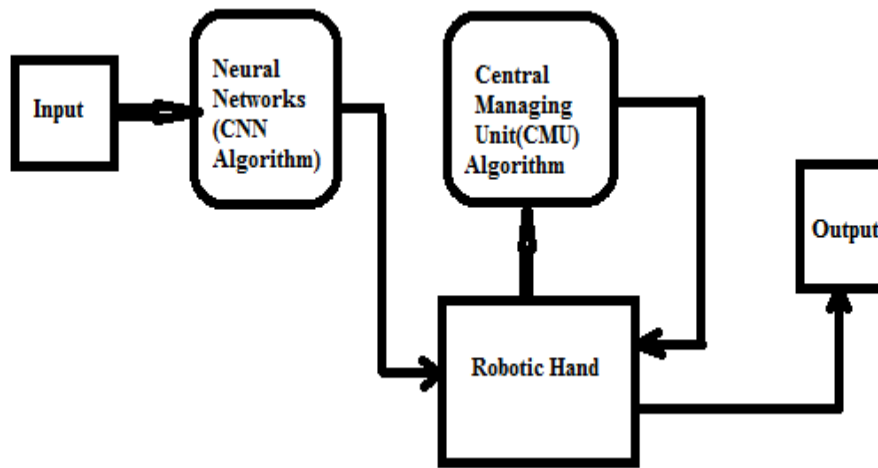


Fig. 4. System Design

5. Conclusion

In this paper a new algorithm CMU algorithm is used for identifying the the objects without confusion along with Neural Network Algorithms – Convolution Neural Networks and Image AI algorithms for detecting the objects using the camera. By using the CMU algorithm for multiple hands we can increase the speed and efficiency in harvesting the vegetables/fruits.

In the future work the proposed algorithm is in implementation process and it will be used in real time, such as in agriculture i.e, in the farm like harvesting tomatoes, chillies, brinjal etc.,.

References

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