How a Robot See the World

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Have you ever thought that you would work with many robots? It is cool! And with the development of modern society, robot has gradually entered our life .

However, even the technology being so well-developed, problems are always in the way when people want to progress it. The major problem is about CV( Computer Vision ) ,more specifically, how to make the robot see by a camera, laser or any other hardware which can collect the image data from the environment around robot or people.

A general way to implement the robot vision can sum up to 3 steps. First of all,collecting clean and sharp ( sharp image means the data was collected very well and can be use easily in most case )image data using cameras or lasers from the environment. Secondly, identifying the image by a computer program and math tools.Finally, using suitable optimize algorithm to calculate the information we need from the data and analyze the final consequence to find a reliable way to help robot see the world. In normal circumstances,a robot can work efficiently as long as we have alreadly carried out these 3 steps properly.

Now,let’s talk about the 3 steps in datail.When we are collecting image data from the environment,we should pay most attention to it in all these 3 steps,because any tiny disturbance will have large effect on the quallity of the image.No matter what you use, a camera , lasers,or a high technology stuff like special radar in military installation, the only purpose is to obtain a set of sharp images which contain less noise and more clean lines with every objects in the image data. Most laboratories often use camera or laser to collect this data, so the algorithm to analyze this data is about how to handle a set of picture pixels one by one or group those pixels and handle them group by group.

When a sharp image data has already been collected and the sets of picture pixels have already been grouped by the computer, a most general algorithm named ‘ Feature Point Extraction’ [1]should be used to identify objects. Actually, it is extraordinarily difficult for us to make a computer or a robort collect image data like a real person ,because the real world is continuous and each place is a continuous object rather than a isolate point. The real picture a robot can collect was a matrix consisting of many rows and columns which filled with numbers from 0 to 255( in hexadecimal number is from 00 to FF, also in binary number is from 00000000 to 11111111 )[2]. So usually we can calculate these numbers use mathematic methods to solve the problem about identifying objects.

If a pure image was calculated into a special data table which contains many identifying objects, a robot can easily find a route to walk. This process was defined as a vision case of ‘robot like normal person’[3]. A robot can identify these objects in his camera using some mathematic algorithms and calculate some necessary information like the distance between him and the objects around, the relation of these objects, and even ‘guess’ what the objects can do. And all those functions were based on the implement of robot vision.

Robot vision is a high-technology field in this industry with more and more people making contributions to it in recent years, especially in China and India. To make things more intelligence and even smarter than a real person, scientists never give up. And they believe a smart robot which can totally take place of people will be produced in the feature if they continuously make eﬀorts in the mathematic or computer vision works. However,when it comes to if people should invent such robot,different people hold different views. Some people think human beings will completely free their hands and all the things will be handed over by the intelligent robot,while others are afraid that the intelligence of robots will exceed human’s, by that time, artificial intelligence would replace human,taking control of the world!

From my perspective, In the development of robot industry, we should have a good grasp of the degree. In this limit, try to develop the artificial intelligence to the extreme! Once we have a good degree, fears can be eliminated, and we can also use artificial intelligence to help us. I believe that we must be able to have a more intelligent, scientific, beautiful society in the future!

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**Reference:**

[1]Marc Pollefeys,“Feature point extraction”, [Online document], 2002.Nov.[2002 Nov 22], Available at HTTP:http://www.cs.unc.edu/~marc/tutorial/node51.html

[2] RC. Gonzalez，and RE. Woods, Digital Image Processing , United States of America: Prentice-Hall, Inc., 2006.

[3]  Alyosha Efros,  "Scene semantics from long-term observation of people," vol. 46, no. 23, pp. 16-25,Nov. 2016,