Ghost in the machine

Life is “Trying things to see if they work”.

By

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Guide

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Abstract

A formative process of dealing with my special project under the guidance of Professor Mohanty ended with the discovery of a ghost in my machine. The project ‘Ghost in the machine’ is a kind attempt to question the nature of creativity or so called ‘art’. From studying drawings done by children to the robots playing chess and painting on canvas the paper is the result of an experimental formative approach. It is an attempt to answer some of the questions arose during my this journey of enjoying children drawing mountains, sun and river and my those happy moments of programming my desktop machine.

Questioning the nature of creativity and experimenting with my computer to create pieces of art led me to my special project ‘Ghost in the machine’. The idea was to generate pieces of so called art or creativity in collaboration with machines.

“Creative machines?”; “Can machines be creative?” My thoughts and attempts to explore the same, to seek in the field with a positive approach of making machines creative, which can generate pieces of so called ‘art’, are documented in the paper. I think Life is ‘Trying things to see if they work’. With this approach I tried to put across a thought in this paper.

Keywords

Creativity, Computer and Art, Formative approach, Artificial Intelligence, AARON, computer programming

Introduction

‘It is by logic that we prove, but by intuition that we create.’

Creativity: the ability to make or bring into existence something new, whether solution, or new artistic object or form. Creativity is one of those things which make humans so special. But could there ever be a day when computers are composers, theoretical physicists, or artists?

There are already a number of projects in artificial intelligence that try to recreate creativity in computers. Harold Cohen has spent his whole career designing a program called Aaron which creates original works of art.

How did Shakespeare create those words? Can we understand how to be creative? Can we distill the process to a set of rules? If so, could we program a computer to be creative?

Hypothesis

The memories when I myself was a child & evidences of my drawings of those days say that I was a very creative artist. My drawings also show my skill as a good observer of environment around me and power to put them on paper. I have a very creative family. My father is an architect and his creativity speaks itself in his amazing work of monuments he has built for more than 30 years. My mother is very creative in her writings as well as her crafts as far I have seen in her knitting works. Elder sister Sweta proves herself the best among us by her colorful Rangolis and her paintings hanged in my home. My elder sister' son, Jini has been drawing like a five-years-old since he was two-and-a-half. And then I were to introduce one another member of my family, my creative computer sitting on my desk, would I mean the same thing by the word "creative"?

Back in the days of school, I used to have a book titled a 'creative writing' to help increase so called creativity in my essays and comprehensions. My mother used to see a television program which shows ways to make creative food decorations by arranging various shaped cut pieces of vegetables. Every week my mail offers me software which is guaranteed for 25$ or some more to increase my personal creativity. What can it possibly mean? Where does intelligence end and this presumably higher, entity begin?

Having said all of which, I have to confess that when I think about the way my favorite writer Tarak Maheta describes the world around us in Mumbai or fascinating rhythms A. R. Raheman generates or the way Bonnard used colour and the way Dali put thoughts on canvas, I do find it hard to avoid impression that there is indeed some behavior that appears to be distinct from intelligence or skill, whether we chose to call it creativity or not, and whether I can find the line that separating the two.

Ask most chess grandmasters if chess is art and they will say unequivocally, "Yes." Ask them if chess is also a sport and the answer will again be yes. But suggest that chess might be just a very complex math problem and there is immediate resistance.

The question is more than academic. Beginning tomorrow in New York, Garry Kasparov, the world's top-ranked player and the former world champion, will play a $1 million, six-game match against a chess program called Deep Junior. It will be the fourth time that Mr. Kasparov has matched wits against a computer and the first time since he lost a similar match in 1997 to Deep Blue, a chess-playing computer developed by IBM. Recently, Vladimir Kramnik, Mr. Kasparov's former protégé and the current world champion, tied an eight-game match against another chess playing program called Deep Fritz.

Whether Mr. Kasparov wins or loses, clearly chess computers have reached a point where they can compete against, and sometimes beat, the world's best players. Even Mr. Kasparov, always reluctant to

acknowledge that anyone or anything might be superior to him over a chess board, admits that the point at which computers consistently play better than humans is probably not that far off.

But if computers become better than humans at chess, does that mean that computers are being artistic or that chess is essentially a complicated puzzle?

Chess is not the only field where computers have achieved success formerly thought to be achievable only through human creativity. In 1997, six months after the victory by Deep Blue, a competition was held at Stanford University between a human and a computer to see which could compose music in the style of Bach. The computer won.

What is creativity? And how far could I justify the claim that my computer- or any other machine can be in fact creative?

In this paper, I would try to address those questions if I knew what the word “creative” meant: or if I thought I knew what anyone else meant by it.

Methods

It was a good experience to experiment in with a formative process for dealing with projects. As a part of my special project I took a very interesting direction guided by Prof. Mohanty. I stated with an interesting activity of enjoying children drawing. I attended actively and spend lots of time in various drawing competition as well as interacted with children of different age groups. Children workshop at NGMA, Mumbai, conducted by Prof. Raja Mohanty gave me a wonderful opportunity to interact with children. The most interesting point of this workshop was that children expressed their views on the art pieces exhibited at that time in NGMA. It was nice listening to their perspectives to those paintings. My parallel reading on the subjects like art, children, creativity, and so gave me an urge to experiment more and more as well a lot of questions arose.

My memories and inner urge to experiment with all these questions about art and creativity led me to a chain of thoughts centering around the nature of creativity. What is creativity? What is not? Is everything we like to see is art?

Parallel to my special project and these questions, I was very interested these days in generating interactive and static computer generated experiences with the help of programming my desktop computer. Some of my codes have given me such a great outputs which I have never expected as nor visualized even. Through my reading various articles and views of different people on related topic introduced me some of the great work of Prof. Harold Cohen, creator of AARON. My long journey ended with some questions still unanswered. If machine generates something beautiful, is it called an artist? Can machines be creative?

Analysis

I remember when I asked Jini-my elder sister's son, while he was drawing in his sketchbook that "why there are only three mountains in your drawing? You can extend them till your paper ends." He was drawing a scene in which he asked to draw a house, trees, mountains & sun. But, there was a quick answer to my query that "there always do three of them, teacher draws so." More interesting to me was that he has drawn a house in the drawing, kind of house he has never seen his four years of life.

Jini's creation

To clarify the thought more I would like to include here an excerpt from 'Brother Giorgio's Kangaroo' by Harold Cohen.

This is the year 1300. Brother Giorgio, scholar-monk, has the task of making a map of Australia, a big island just south of India. Maps must record what is known about the places they represent, and Giorgio has been told about a strange Australian animal, ratlike, but much bigger, with a long thick tail and a pouch. He draws it, and it comes out like this:

A year later a world traveler is visiting Giorgio's monastery, and he tells our cartographer that he has the animal wrong. For one thing, it isn't carrying a pouch; the pouch is actually part of its belly. For another, it doesn't walk on all fours like a rat but on its hind legs, which are much bigger than its front legs. Giorgio redraws his picture:

But the tail rests on the ground. Giorgio tries once more. The traveler screws up his face in concentration, his eyes closed. I don't think that's quite right, he finally says, but guess it is close enough.

The year is 1987. AARON, a computer, has the task of drawing some people in a botanical garden—not just making a copy of an existing drawing, you understand, but generating as many unique drawings on this theme as may be required of it. What does it have to know in order to accomplish such a task? How could AARON, the program, get written at all?

The problem will seem a lot less mystifying, though not necessarily less difficult, if we think of these stories as having a lot in common. AARON has never seen a person or walked through a botanical garden. Giorgio has never seen a kangaroo. Since most of us today get most of our knowledge of the world indirectly and heavily wrapped in the understanding of other people from grade school teachers to television anchor persons, it should come as no surprise that a computer program doesn't have to experience the world itself in order to know about it. How did Giorgio know about kangaroos before the visitor started

to refine his knowledge? He had been told that the animal was ratlike, but how much good would that has done him if he had never seen a rat? For people, the acquisition of knowledge is cumulative, as it clearly has to be. Nothing is ever understood from scratch. Even the new-born babe has a good deal of knowledge "hard-wired" before it starts. And when we tell each other about the world, it isn't practical or even possible to give a full description of something without referring to some thing else. That's as true for computer programs as it is for people. There is an important difference, though. For people, knowledge must eventually refer back to experience, and people experience the world with their bodies, their brains, their reproductive systems, which computers don't have.

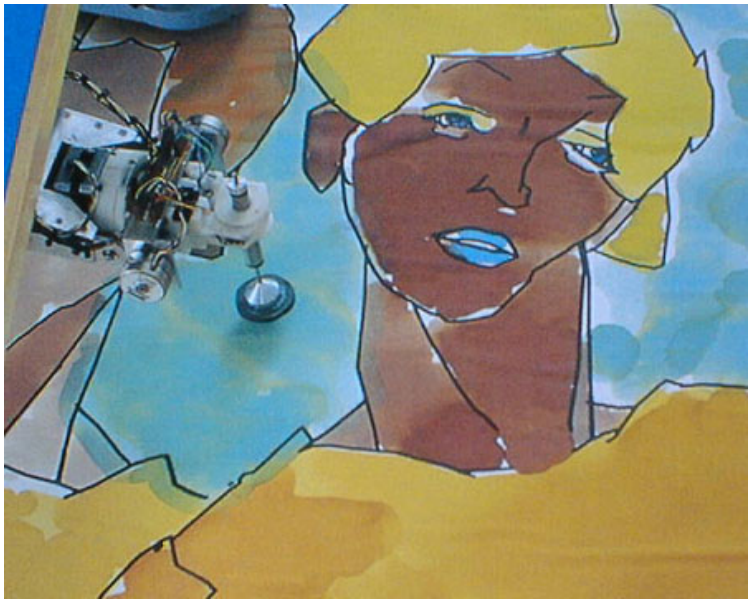
We can draw sometime which we haven’t seen in our life. I remember the days my drawing teacher taught me how to draw a man. A circle on a rectangular base with two lines extending downward and two on the each side generated drawings of so called ‘man’ in my early paintings. It is a different thing that I could learn on my own after that a lot and could put shoes, clothes, and even small-small details to those figures of human by my observation to real world. I could draw spectacles to my drawing of my grandpa. I think that knowledge also can be provided as a list of statements at some stage. That is how exactly AARON works.

At age 31, AARON is a renowned and highly esteemed artist. His huge and colorful still lives and stylized portraits of people have been exhibited worldwide, from London to Los Angeles, from the Netherlands to Japan. AARON's father, Harold Cohen, proudly says that when it comes to work, AARON is very fussy: he is capable of spending a whole day working on a painting, carefully choosing the colors and continuously adding details. AARON is so precise that he never corrects what he does. When he has finished the painting, he cleans the brushes and paint cups meticulously.

Painting generated by AARON


Painting generated by AARON

If he could, AARON would blush for all the compliments he receives for his works. But AARON can't blush; as a matter of fact, he can't understand the flattering remarks directed to him by viewers of his artwork. AARON is a robot. More than that, he was the first robot in history to create original paintings by drawing autonomously and freehand.


AARON coloring one of his paintings

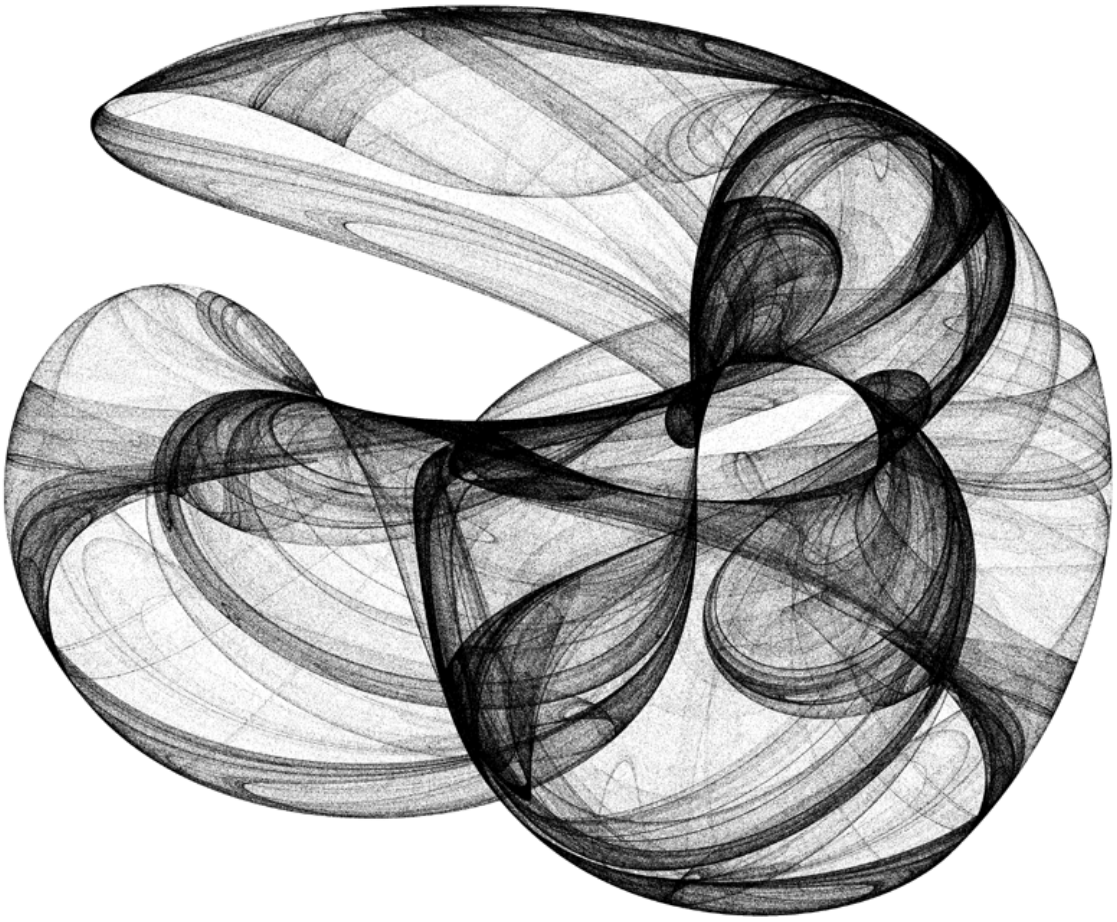
Cohen, a British abstract painter and art professor at the University of California in San Diego, worked for 23 years to create AARON, the automaton.

All these led me to an interesting thought that, yes, though machines can’t be creative, because they are machines, there is something they can help us, may be in exploring our own creativity. Actually we have no particular evidences or reasons to put forward such statements. At this time let me say it may be just mere assumption we have taken.

My interest in creating various experiences on the screen of my computer with the use of programming skill I own led me one day to a amazing piece of so called ‘art’ or something that I would love to see at. I was experimenting with Peter De Jong attractor

$$x_{n+1} = \sin(a\, y_n) - \cos(b\, x_n)$$
$$y_{n+1} = \sin(c\, x_n) - \cos(d\, y_n)$$

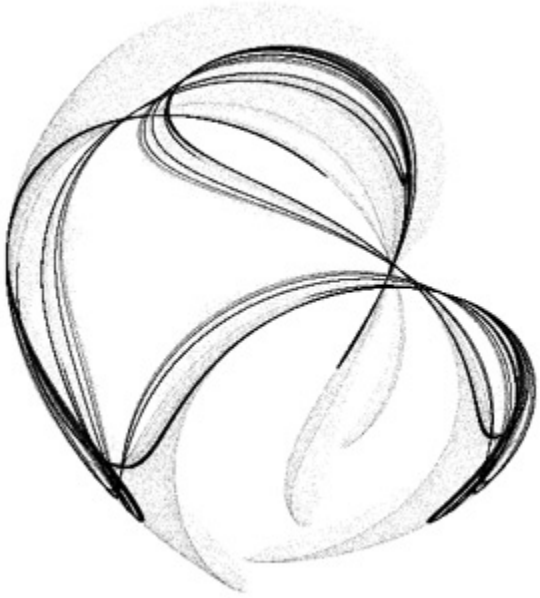
I coded a program which can select values of a,b,c,d on its own with some calculation. The amazing outputs and form the computer generated I had never expected nor even visualized.



The interest in the field increased like nothing. I generated a lot of new experience then after using my basic knowledge in maths and programming. Yes, it is true that I had some idea in my mind that this can be result in something beautiful or interesting, but had no idea of how it will look like and sometime it came as I had never expected. I have generated a whole lot of Peter De Jong’s images with the code I had written. I have taken a line and told her to move around randomly leaving her last image on screen. I taught

some white dots that you all need to follow that white cursor on the screen till u are not tired. And so on. The ghost in the machine created a number of pieces which I think also can be said as ‘Art’.

Here I am including a few of them.



Peter De Jong (variation)

Vertical symmetry invader fractal

Random orbitals

Rotating line algorithm

I know it is a mere machine and it is following blindly my instructions. Whether it is Cohen's AARON or Stefan Prosky's solar powered coloring robots or the my desktop machine with the ghost inside it, I think if it does something artistic, it is artistic, no matter how it does that.

The development of the computer has brought with it a cultural revolution of massive proportions, a revolution no less massive for being almost silent. We are living now in its early stages, and it would be difficult to predict - certainly well outside the scope of this article - what changes will be effected within the next two or three decades. I think it is clear, however, that well within that period, subject to such issues as public education, the computer will have come to be regarded as a fundamental tool by almost every conceivable profession. The artists may be among them. That will be the case, obviously, only if it shows itself to have something of a non-trivial nature to offer to the artist; if it can forward his purposes in some significant way.

There is little in 'computer art' to justify such an assumption. On the other hand I have come to believe, through my own work with the machine, that there may be more fundamental notions of purpose, and a more fundamental view of what the machine can accomplish, than we have seen so far; and this article is intended as a speculative enquiry into that proposition.

Speculation is cheap, of course, as the popular media have shown. If you fantasize any given set of capabilities for the computer, without regard to whether the real machine actually possesses them, then you can have it achieving world domination or painting pictures, falling in love or becoming paranoid; anything you wish. I would hope to offer something a little more rigorous, if rather less romantic. Thus I propose to proceed by describing the machine's basic structure and functions, and by giving a simple account of programs of instructions which it can handle with those functions. It should not prove necessary to make any speculation which cannot be stated in terms of these.

All the same, the undertaking is not without its difficulties. There is no doubt that the machine can forward artists' purposes. It has forwarded a reasonable range of specific purposes already - some have been trivial, some have not - and there is no reason why that range should not be extended. But the significance of the question would seem to point to the notion of Purpose rather than purposes, implying, if not a hierarchical structure with Ultimate Purpose sitting on top as its informing principle, certainly a structure of some sort which relates all of an artist's individual purposes.

The chain of interrogation: Why did you paint this picture blue? Why did you paint this picture? Why do you paint? Is this a good deal, less innocent than it might seem at the first glance? I suspect that the notion of Ultimate Purpose enjoys little currency today: but then it must follow that Purpose is not to be arrived at by backtracking up a hierarchical structure from the things that an artist does, much less from the objects he makes. The problem is rather to propose a structure which can be seen, as a whole, to account for the things the artist does. The notion of Purpose might then reasonably be thought to characterize that structure, as a whole.

In what terms, then, would it be possible to maintain that the use of the computer might ‘advance the artist's Purpose’? Any claim based upon the evidence that 'art’ has been produced would need to be examined with some care, and in the absence of any firm agreement as to what is acceptable as art we would probably want to see, at least, that the ‘Art’ had some very fundamental characteristics in common with what we ordinarily view as art. This could not be done only on the basis of its physical characteristics: merely looking like an existing art object would not do. We would rather want to see it demonstrated that the machine behavior which resulted in the 'art’ had fundamental characteristics in common with what we know of art-making behavior.

The step by step account of the computer's functions and its programs was intended, of course, to try to demonstrate that the machine can be used in this way. The original question - whether the machine can serve the artist's Purpose - is more redundant than unanswerable, and is in any case not to be confused with asking whether artists might see a need to use it. It is characteristic of our culture both that we search out things to satisfy current needs, and also that we restate our needs in terms of the new things we have found. Nor is it necessarily immediately clear what wide cultural needs those things might eventually serve. The notion of universal literacy did not follow immediately upon the development of moveable type, but it did follow that development, not demand it. Up to this point the computer has existed for the artist only as a somewhat frightening, but essentially trivial toy. When it becomes clear to him that the computer is, in fact, an abstract machine of great power, a general purpose tool capable of delimiting his mind as other machines delimit him physically, then its use will be inevitable.

Conclusions

This is not another article about ‘computer art’.

Harold has created a model of the artist at work providing an insight into the workings of an artist by formalizing the creative process. Working in a similar field, Viennese researchers are teaching a computer to play like a human pianist, finding patterns in the performance of real pianists. In other words, they are reducing a creative event to a sequence of rules. It is getting harder all the time to tell where man stops and machine starts.

So the question is whether we assume that there will forever be a core of human attributes, like creativity, which will never be taken on board by machine.

I do strongly agree with the thought here that any combinations of lines and closed forms created with those lines with colors filled in them which make sense as identifiable figures created by AARON or any outputs generated by my workstation from those programmed codes can’t be called as art. But other than defining what is looking good or so called art these machines can help us do other stuffs to generate creative pieces of outputs.

I think life is ‘Trying things to see if they work’. I am trying to teach creativity to my computer with the hope that one day it will itself generate a piece of so called ‘art’.

I would like to add at this time, that they have not became like us yet as they are not still thinking as we think about them or not writing as I am doing here, but something they achieved that it makes us think and to me write on the topic. Let’s see, where it goes.

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