

## Image Machine and Artificial Intelligence

It is needless to speculate whether an image machine for artists which is based on artificial intelligence techniques is possible (or even desirable). I would like to say instead that images, more than any other form or representation, expression and communication, are symptomatic for the aesthetic ideal of a society at any given time.

The concern of artificial intelligence for images is part of the concern for intelligence and ways to capture it in some computable form (symbolic computation, in particular). In fact, not images but vision is what interests AI scientists, because the understanding of images and their appropriate interpretation by machines would endow such machines with what is commonly defined as intelligence.

The production of images, for artistic or non-artistic purposes, has been viewed as quite orthogonal to the subject matter of artificial intelligence. Exception to this makes the attempt to generate graphic interfaces within automatic programming. Interested in general issues of intelligence and having devoted quite a bit of my research to images, I suggested that images are not only a means of representing human or machine intelligence, but also constitutively participate in human intelligence and embody aspects of it. We definitely know from cognitive science that the intelligence of visually endowed people is different from that of people with a tendency towards language, music, or the abstraction of algebra. We know from both art and science that, among the various forms of intelligence, visual intelligence plays an unusual role. It constitutes 8-locus for interaction with other forms. Accordingly, my research focuses on the knowledge embodied in images and how this knowledge – not exclusively of a visual nature – can be used to intelligently generate new images. In particular images with an artistic purpose.

This research was carried out against the background of heated controversy among cognitive scientists (Fodor, Pylyshyn, Anderson and others) who regarded the nature of images and their participation in human thinking. For the purpose of the discussion, the subject can be condensed in the question:

Is an intelligent image machine possible?

If yes, how pertinent is it to the work of artists? Can it serve as an extension of their own intelligence?

By image machine one can understand a device which will automatically generate images satisfying criteria characteristic of their function. However, in view of the fact that no matter what the function is – representation of data, design of new objects, dynamic sequences of frames, paintings, animation, etc. – we expect images to have an aesthetic integrity, the question becomes whether aesthetic knowledge can be captured. The question further focuses on the kind of intelligence necessary to automatically make an image attractive, pleasing, precise, etc. and what is more difficult, interpretable according to the pragmatics for which it was generated.

Finally, while we know about the aesthetics of the past-aesthetics being always after art and not in anticipation of it – we don't know enough about the influence of the new media and new tools on our aesthetic ideals. So we would like the intelligent machine to have (contain) some sense of history and display awareness of it. The established artificial intelligence techniques are actually ill-suited to handling such problems or the visual because, without exception, they are based on paradigms originating in language use and on logic along a synchronic axis.

Consequently, we have to either establish new paradigms or to develop techniques which, taking advantage of available AI tools – probably modifying them – will also allow for the handling of qualitative properties of images and of the dynamics (diachronic axis) implicit in an image. This, of course, in conjunction with computer graphics procedures, which we would like to endow with enough intelligence so that displaying an image will be not mere representation but, to the extent of our own expertise, an interpreted representation. The problem arises every time we want to visualize very complex information. The CAD complex representation of a future product is a computer graphics problem. To automatically find which section of the representation is relevant to the designers work and to generate it by using rules embodied in a program are issues of artificial intelligence. It involves, for instance, building evaluation procedures into the *computer graphics engine*. To accomplish this, we have to define contexts and their interrelations. Such an intelligent component, together with other intelligent elements, were incorporated in “MIND- A Design Machine” which I (and Marcos Novak) recently designed. This intelligent machine integrates work previously submitted for the electronic book, an interactive manual for repair and maintenance of complex installations. This manual exists only as an intelligent program, whose pages are generated each time a situation requires online, interactive documentation. It is a book which becomes reality only to the extent we need it.

Another type of intelligence, originating in the understanding of the physical world of actions and movements, can be embodied in tools which will allow animation of images and even automatic generation of events in sequence. The *Simulation Machine* I proposed is a program with sufficient knowledge about the physical world so that each object represented on the screen *knows* enough about the others to avoid collisions (or to simulate them if we so wish); it knows about perspective, color, lighting, and even laws of composition.

Of course, there are other avenues to be explored. But before Jetting optimism take over, two observations concerning the limits of the approach should be made.

One: images do not appear in a vacuum; they are, even more than words [though less than sounds), an expression of shared conventions and of shared praxis, Capturing the entire context of this praxis in artificial intelligence programs is a utopian project comparable only to Borges' fantastic image of a map as big as the mapped territory. We can only capture segments of this space of human interaction, and we can hope that each time we do, we learn more about ourselves, without making ourselves less necessary in the social context of using and generating images.

The second observation is even more drastic. I would like to quote Charles S. Peirce, my master, from an article written in 1887 about logical machines:

A reasoning machine “*is destitute of all originality, of all initiative. It cannot find its own problems* “. This does not mean that the limited task we stiff pursue with an image machine is less challenging or easier to accomplish because we, not the machine, defined the problems.