IGNORANCE, MYOPIA, and NAÏVETÉ in "IGNORANCE, MYOPIA, and NAÏVETÉ in COMPUTER VISION SYSTEMS" by Ramesh Jain and Thomas Binford

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I started reading the above-mentioned paper with high expectations: at last, two renowned computer vision experts are going to tell us all that's wrong with the field, showing us that, indeed, we are running around naked, while pretending to be dressed in majestically crafted designer robes labeled "COMPUTER VISION Inc." However as I went along, my disappointment increased: I could not help having the feeling that what they are really telling me is that it is preferable to be rich, young and healthy than poor, old and sick.

I did my Masters at the Technion, analyzing models of neural coding. I was, at the time, naïvely, myopically, and ignorantly enthusiastic to learn about the transmission of information in trains of nerve spikes, and found some ways to analyze models of coding using methods from the theory of pulse coded communications, that I just learned about. Then I looked around and realized that nobody was interested in such things any more, in the aftermath of the big disappointment with cybernetics. Physiologists did not want mathematical models but experiments, and communications engineers did not see any challenge in the low information rate code apparently being employed by the nervous system. This was in 1980, and the neural networks craze was yet to come!

For my doctorate, I decided to move into a respectable field, and went to Stanford to work in the "hard-core" subject of estimation theory. Estimation theory has a few very well defined, hard problems, and today, there are already many solutions competing to squeeze the apparently last drops of juice left in these problems, by being ever faster, more easily implementable on modular computer architectures, etc. After finishing my Ph.D., almost by chance I started to look at some new problems, and they turned out to be related to computer vision. From a field with a few problems and many solutions I drifted into a field of many problems and few solutions. This was quite exciting, again due, I guess, to my ignorance, myopia and naïveté in the field.

Now, after five years of playing the field in computer vision, I am much wiser. I know: there are no solutions to general problems in machine vision, because there are no general machine vision problems. The issues are varied, there are zillions of aspects of every real problem and few suitable tools. Some mathematical disciplines such as differential geometry, topology of surfaces, discrete geometry, linear programming and algebraic geometry, seem to be relevant. I believe that existing tools should be perfected, and that pertinent mathematical disciplines should be better understood. My plea, if I may have one, is for simplicity. If someone has mastered a mathematical technique that seems to be relevant, let him or her explain to us these findings in simple terms. We should not be intimidated by papers using "advanced or obscure mathematics", should never believe claims supported by references to a mathematical theory that soars high above our heads, and should not consider it "common sense to keep quiet" when faced with those who snow us under. We have the duty to require those referring to so-called high class mathematics to show us that they really understand what they are doing, and to do so by demonstrating a capability to explain and prove their statements with

elementary means. It should come as no surprise to us to discover that some of them cannot really do so.

An honest paper in computer vision (and in any other field, for that matter) should clearly state the problem, its motivation, explain the methods for solving it and compare the solution to the alternatives, if any. We must encourage this approach by not accepting papers waving at us vague and not well understood physiological findings as their sole raison d'être, by being extremely cautious with those who make bombastic claims of solving general problems or put forward cloudy and fuzzy discussions about the universal utility of their techniques and by appreciating a bit more papers that directly address real-life applications. Beyond that, I strongly believe that we cannot really say where and how the research in this field should proceed. We must lend more credit to the communal wisdom. In summary, I think that ours is a field like every other developing engineering or scientific discipline. There are false starts, and false stars and false prophets too; there is emphasis on techniques, there are overstatements, exaggerated expectations, and disappointments; there is ignorance, myopia and naïveté and all that. But there are also many interesting things going on. One thing however is certain: neither papers like this, nor such responses for that matter, are really needed for us to see the light.

P. S. This paper generated a few deep, programmatic sentences that should make it into "Bartlett's Famous Quotations."

Some examples:

"Approaches based on qualitative reasoning are a good step in analyzing phenomena that can only be captured at qualitative level."

"Search is very important, but without adequate use of knowledge it is computationally impractical."

"If we want vision systems to be intelligent and powerful, we will have to remove their ignorance."

"Both math-hacking and computer-hacking have a place in computer vision, but they are equally adhoc." (Perhaps it should have been "equally ad-hack.")

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DIALOGUE

Ignorance, Myopia, and Naiveté in Computer Vision Systems

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