09/07/2018 Book review

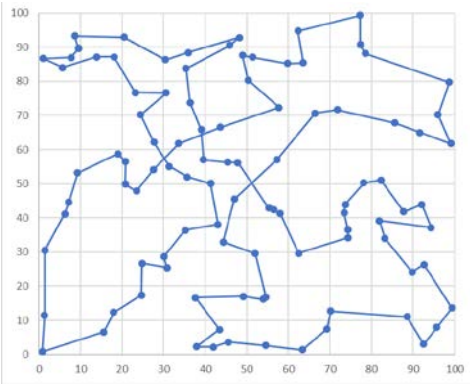
***Thinking, fast and slow*** – Daniel Kahneman

***Artificial Unintelligence*** – Meredith Broussard

There is a difference between how human brains perceive the world and how computers do. So far, not every process in the human mind can be exactly replicated or reconstructed by computer programs. Some aspects of our intuitive mind ("System 1" in Kahneman's book) work so fast that it is impossible to produce an equivalent computer-based system, at least not one that works the same way as we do.

For example, human eyes can recognize whether there is a cross (intersection) in a route immediately. But for computer programs to determine if there is a cross, they need to find the equations of all route segments and treat them pairwise.

Computer is finite, discrete and lacks the fundamental capability to see pictures really as pictures. (It sees pictures as an array of pixels.) The human brain, while built on finite and discrete cells, can at least imagine what it is like to "take the limit", to understand continuity, to really think in 2D or even 3D.




The idea that the human cognition can be entirely reproduced by binary-based machines probably dates back to Dedekind and Peano, and later Bourbaki, who believe that all our knowledge and logic can be traced back to sets, to binary "yes" and "no" questions. Their set-theoretical formulation of natural numbers is a huge success in mathematics and prove to be extremely useful, but their approach is not how the actual mind works. Natural numbers, simple arithmetic and geometric figures are intuitively easier to our mind than any of their formal descriptions.

Bourbaki-style discrete mathematics is the foundation of our computer design and may be a fundamental reason why computers are so good at calculations but are still struggling when it comes to image recognition and natural language processing, tasks that involve the less rational intuitive mind. More research into how human intuition works is needed if we want truly intelligent and truly humanistic machines.