

Rules versus Reason; the Internet of Things; and (Human?) "Experts"

Compsim White Paper

First you might ask: Why the topic? Well, the Internet of Things ("IoT") is the latest "hot topic of the day"; as the "cloud" and the "big data" hype diminishes. But is the IoT anything more than just recognizing that there is just more data that is distributed across the Internet? Perhaps it is time to re-visit the purpose of information processing and the purpose of computers.

First, man created "machines" to amplify human capabilities of strength, speed, and accuracy. Man created "computing machines" to amplify the human's capability to manipulate information. Sometimes man created mechanical machines to go where humans cannot go (size / shape, and to keep humans out of harm's way).

The computer industry has grown up processing "rules". At a historical review of the computer industry, the "conditional branch" was recognized as the most important concept ever developed. How else could we handle all of those IF-THEN-ELSE instructions?

The IoT highlights the success the computer industry has had in adding IF-THEN-ELSE logic to devices, intelligent sensors, distributed data bases, etc. that can all accumulate information from various sources and redistribute that information in other forms that might somehow be of interest to some humans.

At this point, this has not changed the original objective of computers or computerized devices. They collect information and transform it to satisfy the interest of some humans. We are still dependent on the humans to interpret the information.

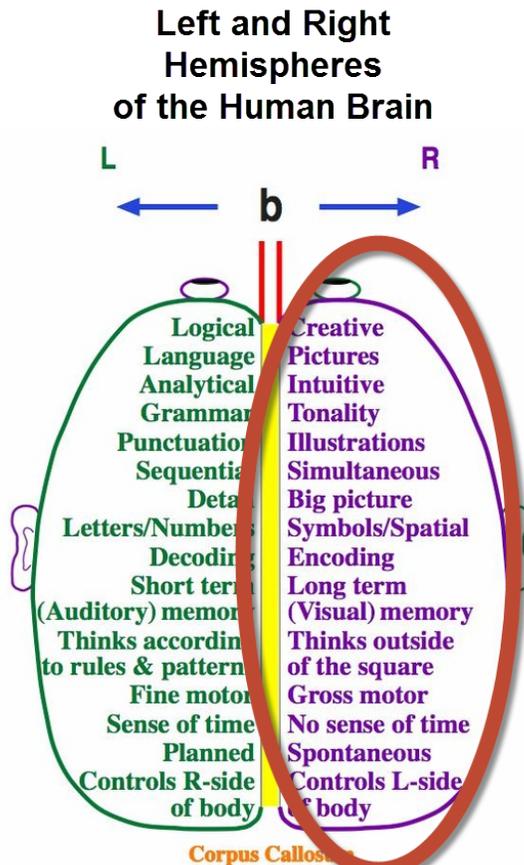
Now to expand on this a little: computerized devices do make a lot of decisions (all of those IF-THEN-ELSE "rule-based" decisions). But when qualitative judgmental decisions need to be made, human "experts" are called in to "interpret the information". Basically the computers give the experts a number or set of numbers, and the human expert decides whether it is "enough", or "too much", and "how much is too much". This then translates to doing something, or not doing something, or how much to do of some "things".

So, in today's view of IoT, we have a collaborative system of machines and humans where complex situations are addressed by the human experts.

So what do you think the weak link is in these systems? Do you think it might possibly be the humans that don't recognize the situation, are diverted for lack of attention, are provided with too much information, or just exercise poor judgment?

Perhaps one might look at a transformative event - the automated delivery of expertise (Smart "things" collaborating). The application of judgment and reasoning are different than processing rules. While the left-brain / right-brain model for the human brain has been disputed as the neuro-psychologists dig

into the mechanics of the human brain, the concept is still appropriate. The left-brain model processes rules sequentially. The right-brain model processes information “collectively”. That is where judgment and reasoning fits because one is processing multiple problems at the same time – comparing alternatives - some of which have conflicting goals: solving short term problems vs. long term objectives, safety versus time, cost versus risk, self versus group...



Untapped Territory for KEEL-based Computing

In summary, consider how much of your time is spent either following rules (simple mechanics: moving arms and legs forward and back) or applying judgment and reasoning. Just walking from one side of a room to another, you use judgment to decide how to navigate around an obstacle. If the world was perfect and everything was known, there would be no need for “adaptive behavior”. You could use the same old IF THEN ELSE logic to process everything. The world is, however, chaotic. Everything needs to adapt. In business you decide how to apply resources to react to market changes. In the military you have to react to enemy actions. In your home, you have to react to changes in family activities.

Now consider where the source of all of the information in the Internet of Things resides. It all resides in the machines (the “Things”). Perhaps a new information processing approach will transform the IoT; one that allows the machines to interpret complex information sources: make decisions, choose between mutually exclusive options, and apply resources. This is the domain we are attacking with Compsim’s Knowledge Enhanced Electronic Logic (KEEL®) Technology with its “right-brain reasoning” approach. And it is relatively easy. And it provides 100% explainable and auditable decisions and

actions. And it is platform and architecture independent. KEEL “tools” allows human “experts” to capture, test, package, audit and explain their use of judgment and reasoning for deployment in the IoT.

There does, however, remain one question: Do human “experts” really want anyone to know the level of their expertise (or lack of expertise)? On the other hand, exposing how decisions and actions are made will improve the process. Maybe the “machines” will become the “real experts”. Companies and organizations will compete with the “most intelligent machines” with the “best embedded policies” to control their behavior. It will no longer be just “smaller, cheaper, faster” IF-THEN-ELSE “Things”.

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