

Emergent Inference and the Future of Nasa

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In my 2010 presentation at this Workshop, I considered the fact that all our current technologies are analyst-dependent because they rely entirely on emergent structures produced by, and only by human brains. I also proposed that truly analyst-independent technologies based on Emergent Inference (EI) are now possible, and are a necessary part of the future of Nasa. Robotics, in particular, depends critically on automation, and automation can not happen without analyst-independence. Today, in 2011, I must repeat the same statements.

Software Engineering (SE) is best known by its many successes. But it has also left a decades-long trail of unsolved problems, the Great Unsolved Automation Problems of SE: objects, refactoring, integration, parallel programming, self-programming, image recognition, the semantic web, ontologies, and counting. All the GUAPs have been extensively engineered, I'd say over-engineered, but none has been automated. The reason for such massive and sustained failure: the GUAPs can not be automated without EI. Without the GUAPs, Robotics can't be automated either.

Today, automating the GUAPs is easy. Since the recent discovery of EI [1], basic procedures for automating objects, refactoring and integration have been demonstrated, and work on self-programming [2] and parallel programming is in progress. However, Nasa continues to plan its future while still relying on old, analyst-dependent technologies.

EI is the mathematical property responsible for cognition [3]. EI is not an algorithm, or a computer program, but it can add a cognitive capability to any program running on any computer. EI-based cognitive computers won't be programmed in the traditional way. They learn through experiences, remember, and adapt by integrating observations into new behaviors ([4] §IV). They mimic the human brain's structural and synaptic plasticity and organize knowledge into fractal structures. In my talk, I will review EI and propose a basic plan for Nasa to begin its development.

[1] S. Pissanetzky. "Coupled dynamics in host-guest complex systems duplicates emergent behavior in the brain." On line: Proc. WASET, **68**, 1-9 (2010).

[2] S. Pissanetzky. "Emergent inference, or how can a program become a self-programming AGI system?" Workshop on Self-Programming in AGI systems. AGI-11 conference, Google Headquarters, Mountain View, CA, August 2011. <http://www.iiim.is/agi-workshop-self-programming/>

[3] S. Pissanetzky. "Emergence and self-organization in partially ordered sets." To appear in Complexity.

[4] S. Pissanetzky. "A new universal model of computation and its contribution to learning, intelligence, parallelism, ontologies, refactoring, and the sharing of resources." Int. J. of Information and Math. Sciences, **5**, 143-173 (Aug. 2009).