What should a network think about its self?

Lionel Sacks

Hu?

- Revisit how to make systems Intelligent…
- Look at where we went “wrong”
- Evidence for a change in perspective
- Look at what use it is
The rise and fall of the “Computational” Logic of Thought

- Early Logic Highlights:
  - Aristotelian logic: categories, 300bc
  - From Syllogisms → Modus Ponens
  - Leibnitz: Binary Logic 1714 – (From I Ching?)
  - Frege: 1890s
    - “...tried to develop effective ways of representing human thought in language and symbols”
  - (Hilberts’ agenda: 1900)
  - Russell – On Denoting / Paradox: 1905
  - & Whitehead 1910
  - Godels’ Theorem: 1931

Alan Turing

- (and Church) Halting problem: 1936
- Universal Logical Computing Machine
- Bletchly Park work: 1943
- Working on ACE: 1946
NPL Report on Intelligent Machinery

- Starts thinking (again) about AI 1948

So far we have been considering machines which are designed for a definite purpose (though the universal machines are in a sense an exception). We might instead consider what happens when we make up a machine in a comparatively unscientific way from some kind of standard components. We could consider some particular machines of this nature and find out what sort of things it is likely to do. Machines which are largely random in their construction in this way will be called 'unorganized machines'. This does not pretend to be an accurate term. It is conceivable that the same machine might be regarded by one man as organized and by another as unorganized.

- And Neural Networks

And A-Life: 1950s

- And Emergence,
- Non-linear dynamics,
- Connectionist theories
- RS Paper on
  - Reaction-Diffusion
  - Code of a Fur Cone
John Von Neumann…

- Game Theory:
  - Theory of Games and Economic Behavior (1944)
- Computers:
  - von Neumann Architecture 1945
- Reproducing Agents
  - Theory only.

And Yet!

- Most Control & Management Approaches
  - a) Remain largely procedural / Logic based
    - Most NN/GA etc. systems used as soft logic
  - b) Remain Monolithic
    - Single points of “Intelligent algorithms”
The shape of networks…

- Networked systems
  - Learn their job!
  - Contain knowledge

- Define the “where”
  - As well as the “how”.

Mission…

♀Monolithic?
  - i.e. Intelligence located at a single point

- Distributed Intelligence
  - “knowledge” exists in connectivity

- Understand how Natural Intelligence works
  - The brain, social intelligent systems, etc.
Beyond “Neural Networks”…

The Brains Control Architecture

Business Objectives

Networked System

Components

The Architecture of Cognitive Control in the Human Prefrontal Cortex, Etienne Koechlin, Chrystèle Ody, Frédérique Kouneiher

SO-GRM Architecture
Biding Tree Overview

Small World Clusters & Contraction

Bid Time to Live BTTL (Per Cluster / Across Net)

Select & Replace Low Value Partner Nodes

A Networked Intelligence

Success Rate (all)

load

Contextual Control
Next Steps

- SO-GRM: Load Measurements
- Developing fully distributed Intelligence
  - Sensor Network context