

Resources

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1 INTRODUCTION

Whenever starting a project, it is necessary to research what others have done. While ‘genetic algorithms’ and ‘neural networks’ are commonly known among practically everyone to be associated with ai, it is not commonly known that in the field of artificial general intelligence, focus has gone toward integrated cognitive architectures. This is also what psychology does - create computational cognitive models and then simulate.

Anyways, once the ideas have been found it is necessary to combine all relevant ones to bear on our cool problem! Notice, that in dodo.org, I mention the need for a domain other than the big bad world to test our agi (artificial general intelligence) in. This is quite similar in spirit to the microdomains recommended by the Copycat/Tabletop architecture. Of course, other architectures use test problems, but the test problem is not a ‘world’ domain as we defined it - they don’t allow exercising areas of all aspects of cognition. Not that that’s a bad thing - but in the end, one would like to exercise all aspects of cognition but in a smaller world (but larger than the microdomains above, which actually test structural representation buildup).

1.1 *Google Keywords*

New terms you might want to google to get better results than ‘genetic algorithms’ or neural nets!

1. Deep belief networks
2. Cognitive Architecture
3. Artificial general intelligence (agi)

1.2 *Getting into the Game*

Resources below have links to appropriate internet places. I particularly recommend accessing first (yes, in this order!)

1. Emotion Machine (Books)
2. Neurocomputing (Overview Paper)
3. Metacat and Fluid Concepts and Creative Analogies book

Also, pay attention to the organization section - this section contains a lot of papers that are referenced in this document - it is basically a good place to discover new ideas.

2 BOOKS

2.1 *Emotion Machine and Society of Mind*

Very nontechnical - but it gives you the right mentality for general intelligence. Contains numerous examples that relate to real situations, and decomposing them into simpler elements. Read it first!

2.2 *Principles of Synthetic Intelligence (MicroPSI/PSI architecture)*

Book on MicroPSI/PSI Architecture

2.3 *Fluid Concepts and Creative Analogies*

Book describing experiments with microdomains and creating structural representations from them. See Copycat in architecture below.

3 OVERVIEW PAPERS

These papers give general overviews of current works.

3.1 *NeuroComputing - World Survey of Artificial brains, part II (2010)*

An overview of three general types of neurcomputing architectures and some more in detail description of representative samples. <http://web.eecs.utk.edu/~itamar/Papers/NeuroComputing2010.pdf>

4 ARCHITECTURES

4.1 *4DRCS*

I havent read this, but abstract sounds interesting.

4.2 *Shruti*

“We are capable of drawing a variety of inferences effortlessly, spontaneously, and with remarkable efficiency — as though these inferences are a reflex response of our cognitive apparatus. This remarkable human ability poses a challenge for cognitive science and computational neuroscience: How can a system of slow neuron-like elements represent a large body of systematic knowledge and perform a wide range of inferences with such speed?

SHRUTI attempts to address this challenge by demonstrating how a connectionist network can encode a large body of semantic and episodic facts, systematic rule-like mappings, knowledge about entities, and types, and yet perform a wide range of reflexive inferences within a few hundred milliseconds.”

The related paper is called *From simple associations to systematic reasoning: a connectionist en-coding of rules, variables, and dynamic bindings using temporal synchrony*

4.3 *Copycat/Tabletop*

Not an architecture per se, but each problem is a microdomain in which a structural representation is stochastically built of the problem (or something like that!). The idea is that, while other architectures encode representations which the human programmer gives to it, a real ai architecture should be able to build its own representation of the situation. A book on these various microdomains is *Fluid Concepts and Creative Analogies*

Metacat <http://www.cogsci.indiana.edu/microdomains.html>

4.4 *DESTIN*

Created by AREL it is a deep belief network for visual perception (right now). Current direction is to create quality open source software - this is being pursued with opencog people (for example, see <http://blog.opencog.org/2011/02/21/destin-vision-development/>)

4.5 *SAL Integrated Architecture*

Integrates Leabra and Act-R . Leibr is a low level neuron implementation and act-r is more abstract. DARPA contract summary - phase 1

4.6 *PSI/MicroPSI*

Book on it: Principles of Synthetic Intelligence

4.7 *AMBR/DUAL (partially based on societ of mind)*

<http://alexpetrov.com/proj/>

4.8 *Opencog*

4.9 *MMP initiative (core part is an architecture based on Emotion Machine)*

4.9.1 **About**

MMP Article

4.9.2 **EM-ONE Thesis**

4.9.3 **Funk2**

Funk2 is an open source programming language that has been created to make the Emotion Machine architecture. It is a core part of the MMP. This work started by being based off of Push Singh's EM-ONE Thesis in which he implements a limited form of the Emotion Machine architecture in common lisp. A thesis proposal for Funk2 is here Funk2 Thesis Proposal.

Github Repository

5 ORGANIZATIONS

5.1 *AAAI - Association for the Advancement of Artificial Intelligence*

<http://www.aaai.org/home.html> On this website, many papers can be found on AI, including many about architectures previously mentioned. "Founded in 1979, the Association for the Advancement of Artificial Intelligence (AAAI) (formerly the American Association for Artificial Intelligence) is a nonprofit scientific society devoted to advancing the scientific understanding of the mechanisms underlying thought and intelligent behavior and their embodiment in machines. AAAI also aims to increase public understanding of artificial intelligence, improve the teaching and training of AI practitioners, and provide guidance for research planners and funders concerning the importance and potential of current AI developments and future directions."

6 OTHER WEBSITES

<http://www.adaptiveai.com/technology.html>

<http://ir.lib.sfu.ca/bitstream/1892/10815/1/etd4481.pdf>

<http://www.acceleratingfuture.com/people-blog/2008/cognitive-architectures-where-do-we-go-from-here/>

<http://neuromin.de/an/neuralmom.html>

<http://web.media.mit.edu/~minsky/papers/Internal%20Grounding.html>