

## Re: Hawkins ideas on building AI's

**Source:** <http://sci.tech-archive.net/Archive/sci.cognitive/2004-10/0709.html>

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**From:** dan michaels (*feedbackdroids\_at\_yahoo.com*)

**Date:** 10/26/04

Date: 26 Oct 2004 12:40:58 -0700

bkaz\_@hotmail.com (bkaz) wrote in message

news:<def186b4.0410241753.159dff92@posting.google.com>...

> > Sure, it takes a while to develop a proper network structure, & a  
> > mature brain may not be plastic enough anyway. My point is, the brain  
> > can't a priori 'expect' anything on any level of  
> > abstraction/generalization, it's all about learning/adaptation. Well,  
> > at least the part I am interested in.  
> > The learning mechanism must be general purpose, – to the extent that  
> > you know what to learn you don't need to learn it.  
> > You talk about 'noise filtering' & 'features extraction' as if it's  
> > unique to low-level vision. I think there's the same mechanism at work  
> > on the higher levels, we simply use different terms for it.  
>  
> > That's where we differ. My point was that the 30 cortical visual areas  
> > are there for a purpose, and this is to provide the memory-prediction  
> > system with a "boiled-down" version of the incoming sensory data. B-D  
> > means noise-reduced, redundancy-reduced, salient features noted, etc.  
>  
> Sorry to be repetitive, but noise is an absence of patterns, redundancy  
> is a pattern, & salient features are either patterns or contrast, –  
> unexpected termination of patterns. There're specialized areas on all  
> levels, – they're defined by learned patterns of corresponding  
> generality.  
>  
> > These systems don't generalize, they actually specialize – regards the  
> > nature of the signals sent along to higher centers.  
>  
> There's something unique & counterintuitive (to me) about low vision  
> areas:  
> They don't form around patterns (like 'face' on higher levels), which  
> would be unfeasible for a slow neural architecture because low level  
> patterns are so fleeting.  
> Rather, they form around what I consider are variables of patterns:  
> contrast, orientation, curvature, motion, that are dynamically  
> interconnected into patterns.  
> Still, I think even these 'variables' are learned, & even if they  
> aren't, this peculiarity is not relevant for AI because in computers  
> memory formation is as fast as its access: we can form the variables

> *on the go rather have permanent areas dedicated to them.*  
>

You're right about the "variables of patterns", and this is also how the 30 low-level to mid-level vision areas also work. The basic operations in each of these areas is probably specified genetically, but in a rather diffuse manner, and then they are fine-tuned via experience, during early development. Without some structuring, it's hard to imagine the 30 areas could simply self-organize to in every individual to perform the same functions in each case, simply via experience. The probability of this seems very low. And even if you built a computer system with a very fast memory, you would still have to specify the basic operations to occur in the different levels. Again, I doubt you would ever get the correct operations simply out of self-organization.

We had a discussion of Ralph Linsker's work here last year, and everyone was saying see it self-organizes, and then I went out and read all of the papers, and it turns out Linsker had to carefully fine-tune all of the spatial and temporal parameters in his nets, else they didn't work.

<http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/l/Linsker:Ralph.html>

Regards the generalization stuff, since you read Hawkin's book already, he has several multi-level sensory-motor-chain diagrams in later chapters ... doesn't his model indicate an increasing level of abstraction/generalization as you go up the chain on the one side, and back down it on the other? And that processing at the lower levels is more specific in both cases?

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> > *This greatly reduces the processing requirements on the high-level*  
> > *systems. This is what nature discovered. The higher centers will use this*  
> > *data to build generalizations, which will be much much easier for them*  
> > *to do, because the problem/search space has been greatly reduced ahead*  
> > *of time.*

>  
> *Again, that search space reduction happens on every level, by*  
> *filtering out low-generality patterns, where necessary generality is*  
> *increasing with elevation & anything less general is considered*  
> *'noise'.*

>  
> *Here's where I differ with Hawkins (or with evolution?), my hierarchy*  
> *is not necessarily of composition, or of novelty, it is of generality:*  
> *accumulated/projected match of constituent patterns.*

>  
> > *With tonque-vision, only the most simplistic transforms take place*  
> > *[namely position and maybe size and maybe a little about edges], and*  
> > *the resolution is extremely poor. This form of vision substitution*  
> > *does not have the raw ability to replace the real thing. Solving the*

- > > *real vision problem takes a lot more system complexity. My guess is*
- > > *biology evolved the 30 visual areas in order to resolve a lot of*
- > > *ambiguities that a totally naive high-level memory system would never*
- > > *be able to resolve on its own accord – at the very least not before*
- > > *the animal was killed by some predator.*
- >
- > *You may be right, bio-vision probably does those indiscriminate*
- > *transforms, sort of like image compression, but that's only because*
- > *it's too slow (per 'processor') to do individual pattern recognition,*
- > *which would be far more logical and 'cost-efficient'.*
- >

Yeah, you can make a case that speed is the problem, but just the same, all current CV systems use a multi-level hierarchy of operations. Later ones in the chain build upon the output of the previous ones. Just because you get a bigger faster computer doesn't necessarily mean you can get rid of this operational hierarchy. What would a single-level flat-architecture algorithm be? Template matching? Store every single possible case? Doubtful.

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- > > *My sentiments exactly. Endless wordgames and needless arguments.*
- > > *Probably 99% of the "discussions" here offer little of use in building*
- > > *AI's, just endless rehashing of the same old arguments which has been*
- > > *around since Descartes and before. Fine, for a forum on raw*
- > > *philosophy.*
- >
- > *I think philosophy is meaningless by definition: generalization is a*
- > *reduction, philosophy is an empirically non-specific generalization,*
- > *therefore reduction down to nothing.*
- >
- > > *Hawkins at least offers something of use to people*
- > > *interested in AI.*
- >
- > *But very few seem to be interested.*

Well, each to his own interests. Some wanna run rats, some rehash endlessly the classical problems of philosophy, some read Hawkins, and some are interested in trying to build AI's.