

## NEURAL NETWORKS

William Bricken

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A one-page description of neural networks by Hinton, from AAAI-86, is on its way. Strong supporters are Bell Labs, Princeton, Johns Hopkins, and CMU.

## OPINION

Wide open exploratory research, totally inconsistent with our current research. Absolutely no potential for application within ten years.

Connectionism is pop-psycho-science. Fundamental flaws include full-connectivity as a brute substitute for a theory of composition, the assumption of differential continuity of the digital substrate in order to connect to the standard calculus, nodes that are computationally super-weak, intuitive programming of weighting factors, and huge settling times. When a neural network is "taught", each node is preprogrammed, by hand, to weight information that passes through it. The computational process of the network is massive weighted composition ( $ax_1 + bx_2 + \dots$ ) guided by gradient descent until a minimum is settled into. The training process takes hours of CPU time, and when its done, it is problem specific. Retraining is needed for the next problem.

## RECOMMENDATION

Of course, I love the stuff; its, like, far out. Many of us would appreciate an opportunity to play with it.

## GUESSWORK

I suspect the political interest is justified, as long term optimism. It does has formal underpinnings, but I suspect that the gains are those already established by matrix theory. Systolic arrays are a better place to bet. The connections this work has to learning psychology are its weakest point. The psychologists really have no idea about mental processes, and this is the only light. Most folks say Oh Gee! because the underlying knowledge of cognitive psychology, calculus, computer science, and parallelism incorporated in connectionism is remote.

## QUESTION OF THE DAY

Which is more likely to yield an advance in computation:

writing programs that model our knowledge of how humans think, or  
writing programs that model our knowledge of how computers function.

Are humans a good model for AI programs? My answer to this question leads me to avoid computational theories generated by the psychologists.