Analysis of *Learning Representations by Back-Propagating Errors*

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Introduction The authors describe that a two layer network can be used to map input directly to output. From what I understand it seems that they are referring to a network where the relationships are hard coded in to perform some form of analysis. I think the general idea is that a associative network is referring to what we call a neural network. The highlighted problem in the article is that with a simple two layer network, if the inputs are similar, the outputs will be similar. This lead to the authors formulation of the idea of hidden layers and backpropagation.

Opinion I think that it is interesting that they discovered that having multiple layers and backpropagation would allow their models to "learn". When I think about it abstractly it makes sense, but when I think about how there have to be matrices that represent the different states of understanding the complexity definitely increases. Their derivation of the delta rule and gradient descent is pretty amazing considering it looks pretty much the same as what I implemented in the hw02. Luckily today we have a nice programming language that makes it pretty easy to build and train these networks.

I can't really say if there is anything that I disliked about this paper. It was quite the lengthy paper however that is probably due to content. I haven't read a lot of computer science or mathematics papers so reading some of these formulas are definitely a challenge. I would have liked to see some form of code that they used to construct these. I am guessing perhaps they would have done this with MATLAB or maybe in C.

Conclusion I think the most impressive thing about this paper is their demonstration to solve various problems in computer science. The one I found the most interesting was the symmetry problem. Though I don't understand 100%, to me it seems that they discovered a more elegant solution to the problem by using a neural network. I think that is part of the genius of neural networks is that they find patterns that our brains can't even compute when given a large amount of data.