Re: Finding useful functions− part 1

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From: Stargazer (*fuckoff_at_spammers.com*)
Date: 10/28/04

Date: Thu, 28 Oct 2004 12:24:43 −0300

Wolf Kirchmeir wrote:
> *Stargazer wrote:*
>
> *[...]*
> >
> > *In unsupervised learning, there isn't such things as "training*
> > *signals", but just stimuli.*
>
> *How can a training signal be different from a stimulus? Are you*
> *claiming that when you train a dog, the signals its neural networks*
> *receive are different than when it's learning on its own? Are you*
> *claiming that if I cause a signals as I intend, the signal is*
> *different than if it just happens? These are not frivolous questions*
> *− your language impplies them.*

Training signals is a common term, used to mean a prepared
(contrived) sequence of stimuli. It is a jargon used by
artificial neural network researchers, and must be understood
in that context.

> > *If input stimuli are absent, you may*
> > *have only changes of neural connections due to innate architectural*
> > *constraints and noise (which, by the way, is one factor influencing*
> > *biological networks).*
>
> *Er, yup, that's obvious.*

Mrs. Patty had some doubts.

> > *Unsupervised learning is a method that alters*
> > *synaptic connections not because of error propagated from the*
> > *desired outputs (the "training signals")*
>
> *Outputs are training signals? How? I mean, if they are outputs, then*
> *they aren't received by the network, right? So what are you leaving*
> *out here?*

Again, this is common parlance among NN researchers. When you
train a network, you put a pattern in the input and let it
calculate its output. The desired output (what we want it to
learn, the signal that will impart training to the network,
the "training signal") is then compared with this calculated
output and, through backpropagation, error corrections are derived
and that is used to modify internal weights. This is the way
supervised learning is commonly understood to happen.

> , but because of intrinsic properties
> > of the signal itself.
>
> Er, are you saying that the signals received by the network vary
> depending on their source? That may be possible in silicon, but they
> aren't in natural networks. A nerve spike train is a nerve spike train
> no matter what its ultimate origin. It's the _connection_ that
> differentiate sources (eg, the nerves in the optic bundle terminate in
> different parts of the visual cortex.)

Lost you here.
I said that in unsupervised learning, connection weights among neurons
aren't adjusted because of backpropagation of errors (from the outputs),
but instead by an internal process that is driven by the statistical
properties of the signals fed as input. One can say that such
process may use hebbian ideas, just to cite a well known method.

> > If the organism moves, then this is not purely
> > unsupervised, it is a mixture of three processes: unsupervised,
> > supervised and reinforcement learning.
>
> Which is which?
>
> And how do the signals differ in "intrinsic qualities"? Where are the
> supervised, unsupervised, and reinforced learning signals received?
> Where and how are they propagated? How can the receptors tell which is
> is which? What experiments have shown that this is in fact what
> happens in an organism?

Too many questions, Mr Kirchmeir. One can easily write a book
trying to answer all that. Signals differ in their "intrinsic
qualities": different statistical properties. Random signals,
for instance, usually cannot have their dimensions reduced. Signals
obtained from natural environments often may have their
dimensionality reduced significantly. By using methods such as
local principal component analysis or population codes learned
by MDL or even factor analysis by conventional delta−rule process,
one can have important reductions in dimensionality, which reveal
relevant features. In reinforcement learning, the organism will
receive an external indication of how good or bad it is to keep
and use the features just learned.

SG