

A Novel Inference of a Restricted Boltzmann Machine

Matlab code:
<http://bit.ly/dnnicpr2014>

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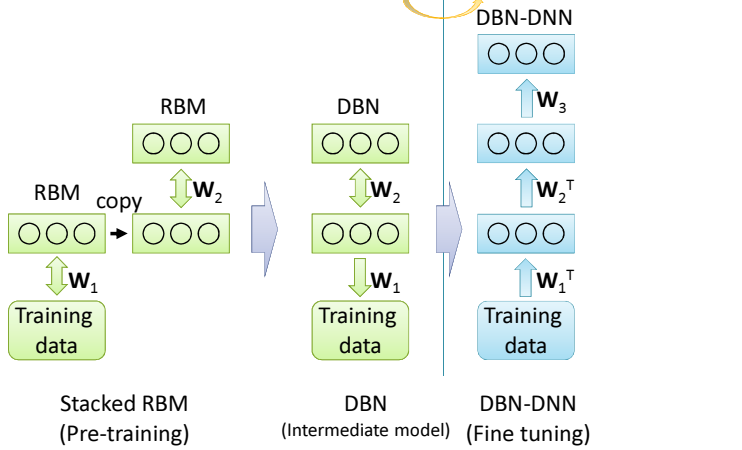


Goal

A novel inference of a Restricted Boltzmann Machine (RBM) is proposed to improve the performance of the Deep Neural Network.

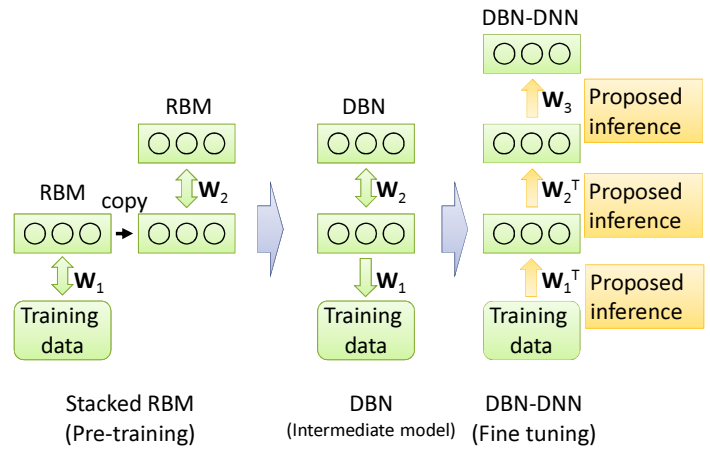
There is transition from probabilistic model to non-probabilistic model.

Probabilistic model Non-probabilistic model



The proposed inference provides a consistent probabilistic models.

Probabilistic model

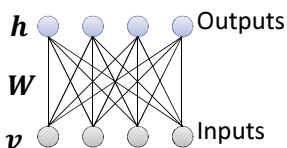


Idea

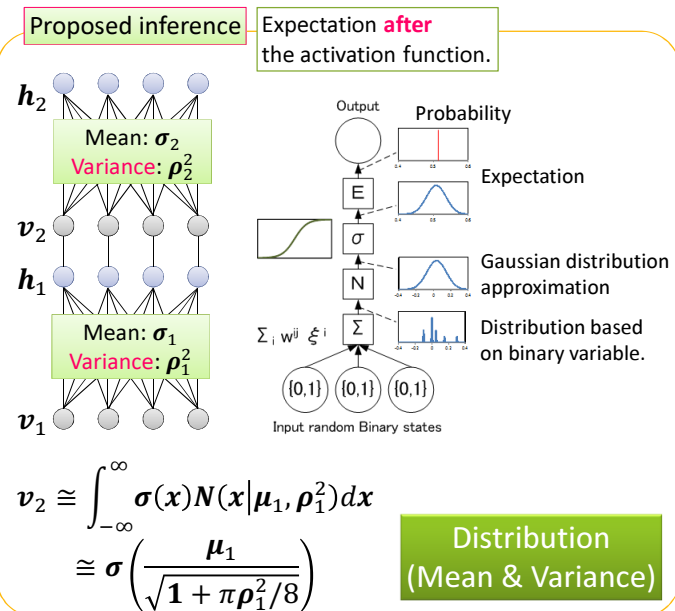
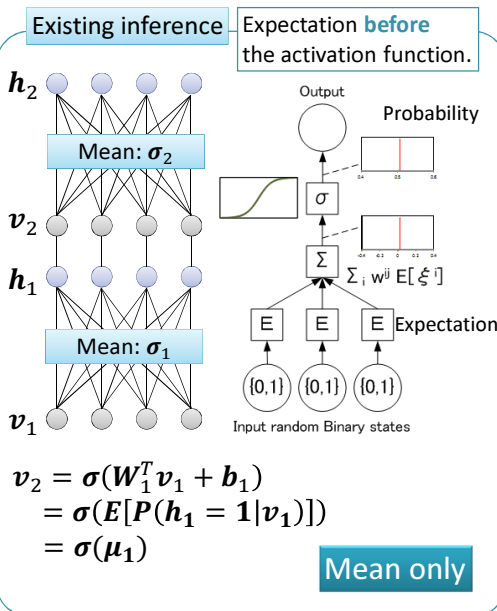
In the proposed inference, the outputs of the RBM are treated as probabilities, while those are treated as states (just values) in the existing inference.

Probabilistic model of the RBM

$$P(h = 1|v) = \sigma(W^T v + b)$$

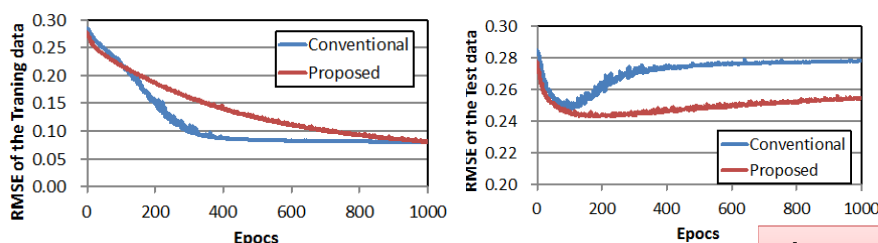


v, h : Binary random variables



Experimental comparisons

> CIFAR-10



(a) Training data

(b) Test data

Numerical comparisons

		Training data		Test data	
		RMSE	ERROR[%]	RMSE	ERROR[%]
CIFAR-10	Existing	0.0806	6.35	0.278	47.5
	Proposed	0.0813	3.14	0.255	45.6
MNIST	Existing	0.0188	0.298	0.0593	1.86
	Proposed	0.0160	0.158	0.0547	1.76

The proposed inference can improve the performance of the DNN.