AbstractID: 1754 Title: Variability in the Outputs of Bayesian Artificial Neural Networks

The purpose of our study was to investigate variation in output values from Bayesian artificial neural networks (BANNs), particularly in comparison to the variation in conventional artificial neural networks (ANNs) that we have shown previously. We trained 32 BANNs and 32 ANNs on a single training dataset drawn from two independent, bivariate normal distributions. The training dataset consisted of 100 normal and 100 abnormal cases. The testing dataset consisted of 1,000 normal and 1,000 abnormal cases. All networks had two input nodes, a single hidden layer containing two hidden nodes and a single output node. Different random initial weights were used to initialize each network. The networks were trained to 500 iterations. The BANNs re-estimated the weight-decay hyperparameter after each iteration. For each testing case we calculated the mean and standard deviation of the outputs from the 32 BANNs and the 32 ANNs. For the ANNs the standard deviations ranged from 0.06 to 0.12. For the BANNs the standard deviations ranged from 0.04 to 0.14. For both types of networks, the largest standard deviation occurred for output values near 0.5 whereas output values closer to 0 and 1 had the smallest standard deviations. There was only a small different in the relationship between standard deviations and output values between the two types of networks. We conclude that similar variation exists in the output values from Bayesian artificial neural networks as from conventional artificial neural networks.