APPLICATION TO MIXED MODELS

C&RT is useful for analyzing both categorical and continuous predictor variables. But it is also quite flexible in analyzing multiple response variables in full-factorial experiments. Some data mining tool packages provide for coded ANCOVA designs to separate the main effects from the interaction effects, similar to a GLM algorithm.

NEURAL NETS FOR PREDICTION

The operation of neural nets for classification was introduced in Chapter 11. Operation of this algorithm for prediction is very similar, except the prediction is not converted to a category at the end. Older algorithms require you to set a number of parameters. Usually, the parameters have default values, but you can modify them. In Chapter 11, we introduced the parameters of learning rate and momentum. In addition, you can change the network architecture (the number of middle, or “hidden,” layers and the number of neurons to be used in each hidden layer). Finally, you may be able to modify the rate at which the learning rate degrades between iterations of the model, permitting a more thorough search over the response surface to find the solution with the lowest (global) minimum error. Therefore, modeling with neural nets is much more of an art than a science. Of course, academics and researchers will twiddle with these settings to optimize a given behavior of the neural net. But the business user will be quite happy to use the default settings most of the time. Why? The reason is that neural nets can produce a model for classification or prediction with default settings that are among the best models possible, and they can do it rather quickly.

Manual or Automated Operation?

Neural net implementations in several common data mining packages provide an automatic operation to select the optimum network architecture (e.g., SPSS Clementine, SAS-EM, and STATISTICA Data Miner). This optimization of network architecture is a huge benefit to the data mining practitioner. Algorithm implementations of this sort permit the user to spend less time on configuring the algorithms and spend more time on model enhancements (see Chapter 13). The STATISTICA Data Miner Recipe interface will train models using multiple algorithms automatically, permitting the data miner to “view” patterns in the data from several mathematical perspectives. This “synoptic” view of data patterns is a powerful means to capture all aspects of the response signal in the model results.

Structuring the Network for Manual Operation

In this context, manual operation means that you set the parameters for the algorithm’s function yourself. Given a learning rate and momentum, the operation of a neural net is controlled by the number of layers and the number of nodes (processing elements) in each layer of the network. There is no best architecture for any particular application.