

**United States Patent** [19]  
**Streit**

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[54] **NEURAL NETWORK FOR MAXIMUM LIKELIHOOD CLASSIFICATION WITH SUPERVISED AND UNSUPERVISED TRAINING CAPABILITY**

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[58] **Field of Search** ..... 395/20-27; 382/155-159

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[57] **ABSTRACT**

A neural network comprising an input layer, two hidden layers for generating a number of outcome class component values, and an output layer for classifying input vectors to an outcome class, under the assumption that the outcome classes are characterized by mixtures of component populations with each component population having a multivariate Gaussian likelihood distribution. The first hidden layer includes a number of first layer nodes each connected receive input vector components from the input layer and generates in response a first layer output value representing the absolute value of the sum of a function of the difference between each input vector component and a threshold value. The second hidden layer includes a plurality of second layer nodes each for generating an outcome class component value, each second layer node being connected to predetermined ones of the first layer nodes and generating in response to the first layer output values an outcome class component value representing a function related to the exponential of the negative square of the sum of first layer output values connected thereto. The output layer includes a plurality of output layer nodes each associated with an outcome class. Each output layer node uses the output class component values from the second layer nodes in combination with weighting values to generate the likelihood that the input vector is properly classified to the output layer node's outcome class.

10 Claims, 1 Drawing Sheet

