# THE RESEARCH OF A CFM HYBRID ARTIFICIAL SALE FORECASTING MODEL

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Recently, the number of Convenience Store (CVS) increases dramatically and its business operation is facing various competitive environments in Taiwan. Sales forecasting of daily fresh foods of CVS is highly complex due to the influence of internal and external environments. However, reliable sales forecasting can improve the quality of decision making and increase its competitiveness. Therefore, in order to improve the enterprise's competitiveness, the manager should be able to make correct decisions based on the available information, and "forecasting" is viewed as an important part before decision making.

Forecasting of the future demand is central to the planning and operation of retail industry. Sales forecasting are essential inputs for decision activities in various functional areas such as marketing, sales, and production. The training data have to satisfy four assuming in regression analysis: (1) normality and resembled variation, (2) independent for each data raw, (3) linear. (4) error-average is 0. [1] With the increasing usage of statistics and probability requirements for forecasting technique have become more critical. As technology requirements increase, so does demand for more exactness and efficiency. A growing number of research studies are now available to shed some light on these two independently via computing with complex statistics or algorithms; but these forecasting systems must deal with the constraints including [2]:

- ■ Large number of items for training
- ■ Substitution of most of the items for each collection subjectively
- ■ Long lead time of considerations of producing and planning of sourcing at a mid-term horizon
- ■ Influence of many explanatory variables. These factors can be: weather data, holiday, marketing action, promotions, fashion, or economic environment.

Because of these constraints, there are more and more researchers tend to use AI forecasting models to deal with forecasting problems [3]. These models all possess fault tolerant ability and high-speed computing ability. The traditional BPNN approaches include some limitations. During the BPNN training one of the limitations is trainer must input a lot of data for training set. On the other hand, the training cost is wasted while the next incremental data add to the model. Like a data mining technique, how to reuse the knowledge we found before is this study focus on. Therefore, the development of a model which can deal with the short-term sales forecasting and the uncertainty as well as the complex relationship between data for convenience store will be a

great help on improving the performance of CVS's competitiveness.

The purpose of the study is to develop a hybrid artificial intelligent sales forecasting model of daily fresh foods for CVS. The Self Organization Map (SOM) neural network and Back Propagation Neural Network (BPNN) is combined to build the hybrid artificial model called Cluster and Forecast Model (CFM). The model is evaluated by a half-year sales data set of daily fresh foods of a chained CVS in Taiwan. The results of the proposed model are compared with the results of BPNN, Fuzzy Neural Network (FNN), Generic Algorithm (GA) and linear logic regression. The results reveal that the proposed model can not only solve the over fit problem and incremental data rescanning but also be used to forecast brand new fresh foods.

## Keywords

Self Organization Map (SOM), Back Propagation Neural Network (BPNN), Forecasting, Convenience Store (CVS), CFM

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