

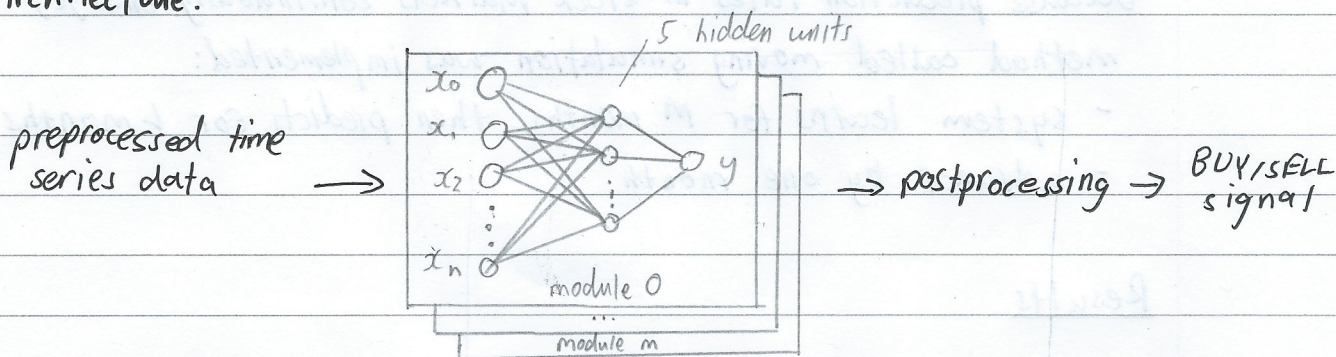
Stock Market Prediction System with

Date 6/9/17

No.

Modular Neural Networks, kimoto, Arikawa, Yoda, Takeoka

Architecture:



High speed learning:

- **Supplementary learning** is a faster variation of traditional backprop.
- Firstly, an error tolerance is set for the output nodes. When a learning example is fed in, back propagation only occurs if the error exceeds the tolerance.

- as learning progresses, less backprop is needed because fewer learning examples will exceed the error threshold \leftarrow these examples are called **learning patterns**

- the learning rate updates dependent on the number of learning patterns, i.e. if more data require backprop, the learning rate will decrease

$$\Delta w(t) = -(\epsilon / \text{num learning patterns}) \frac{\partial E}{\partial w} + \alpha \Delta w(t-1)$$

\swarrow momentum

CONSTANT learning rate \leftarrow

Experiment

- Inputs are moving averages mapped to $[0, 1]$ of the interest rate, DJIA, Forex rates, etc
- y-values are the log differences between the index values at t and $t+1$
- Inputs preprocessed with log/err then normalised to $[0, 1]$.
- $2/3$ training data

- For the first run, test set error is plotted as a function of n -iter, then the second run terminates training at the minimum error point.
- Because prediction rules in stock markets continuously change, a new method called **moving simulation** was implemented:
 - system learns for M months, then predicts for L months
 - advance by one month

Results

- Averaging the modular NNs increases accuracy
- From 1987-1989, the Tokyo index increased by 67%, but following the signals would have led to 98% returns.
- NN outperforms multiple linear regression
- Cluster analysis revealed certain trends: ← cluster analysis done on the hidden layers.
 - high turnover is bullish
 - low interest rates + high DIJA is bullish.

Comments

- Very refreshing to read a high quality, well organised article
- High-speed supplementary learning is possibly not so important nowadays
- Cluster analysis seems to be quite a useful technique
- Not much was revealed regarding exact parameters etc.