The Advantage of Using Artificial Neural Networks in Economy

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Abstract

The advantages offered by the neural models help investors in evaluating the timelines. We have chosen using ANN in this paper, since their learning (training) highly resembles the characteristics associated to human learning.

It is a difficult task to recognise the moment when the price of raw materials hits its lowest (or its highest) break point, often there is a preparation for this recognition. A neural model is being presented to assist a raw materials salesman using a neural network taught with data on raw materials in order to recognise the optimal moment of selling or purchasing certain raw materials before the price reaches its highest or lowest value.

The neural network must be taught to distinguish when the price of certain raw materials approaches its lowest (or highest) point. According to Collard [1] who uses a BPN standard network (multilevel perception), six variables are being taken off the market:

- the opening price of raw materials at the commodities exchange (OPEN)
- the closing price of raw materials at the commodities exchange (CLOSE)
- the lowest price for raw matter at the current market value (LOW)
- the highest price for raw matter at the current market value (HIGH)
- the interest for the specific raw matter (INTEREST)
- the merchandised volume during the day (VOLUME) of the number of future changes for the day.

Each of these indicators are taken for a single day throughout a year, taking into account the normal working weeks and a number of almost 300 days is being reached.

Collard, [1] in his network also includes in the learning set another 18 subjective variables describing the weather (playing an important part) predicting the future price of raw materials, there being highly influenced by dominant weather conditions and other seasonal indicators. Also included as input datum is a historical indicator reached through retrospective evaluation when the raw matter has been purchased in an exaggerate quantity or extremely praised. Also included as input data are the six market variables, but not for the current day but for the last two days starting with the current one from the learning set. That makes on the whole 37 input data: 6 + 18 + 6 + 6 + 1.

In our network we'll keep as input data the following:

– 6 market variables taken three times (for the current day, the one and two days) before the current day

– the historical indicator showing when the raw matter has been largely purchased or over praised

– 10 subjective variables (of the total 11 of Collard [1]) describing the weather status and seasonal indicators like: the level of rain falls in summer and spring, temperature, absence or presence of chemical fertilisers' etc. Mainly, these 10 subjective variables are analogous measures

– a variable indicating the specific day of the year when the market variables are presented to the network (1 to 300). It is a new one comparing to Collard's [1].

Therefore, on the whole, for the neural model presented here we have: 6 + 6 + 6 + 1 + 10 + 1 = 30 input data.

For output we'll consider a single datum having the values:

– 0 for purchasing

– 1 for selling

I.The Architecture of the Neural Model

The neural network used for selling / purchasing raw materials predicting, has a non-standard BPN architecture (sending the error back) and that is an Elman network [2] with three strata:

– an input stratum with 30 knots

– a hidden stratum with 30 knots (the optimal version)

– an exit stratum with 1 knot.

The network’s architecture is presented in Figure no. 1.

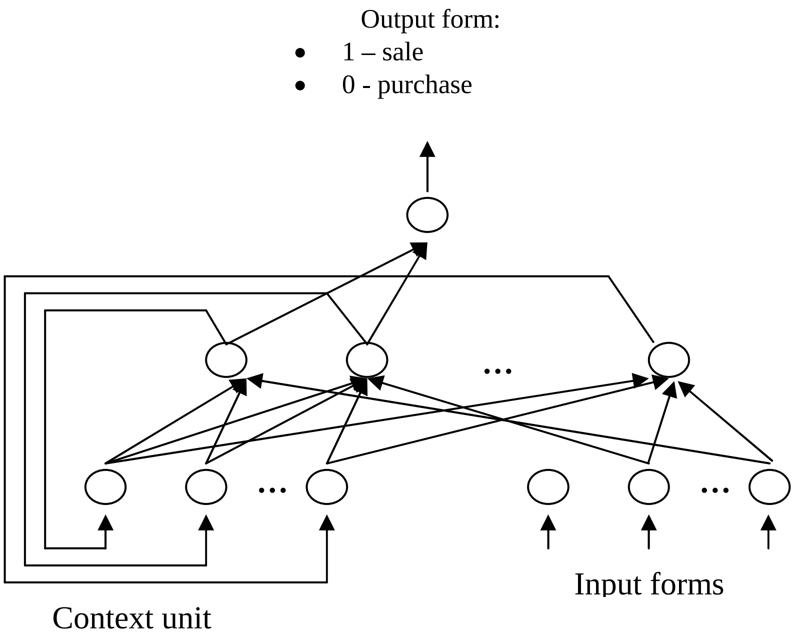

Figure 1. The structure of the Elman network.

The Elman network is mainly a standard, three BPN levels, except for a context units number added to the input stratum.

The context units duplicate activity of the hidden stratum, at the paces of previous time, when entering the network. This variation allows the Elman network to treat contradictory forms (multiple outputs generated by a single input form). The Elman network treats these conflicting situations by enlarging the input form on the condition of a stratum hidden at one pace of the previous time. Thus the feedback unit is essential in establishing the context for the current input, allowing the network to differentiate the “identical” input forms showing up at different moments.

Observe:

– the input forms represent the input stratum (the 30 knots)

- the context units are in the same number as the hidden stratum knots, that is 18.

One of the major advantages offered by this architecture is the decrease of the input data, through identification of identical inputs.

Before presenting the input data set for learning the network they are normalised (brought to values between 0 and 1).

The learning algorithm of the network is the algorithm of propagating the error back (BPN), a supervised algorithm, thus the learning set and the training one is made up of pairs like:

- Input – configuration of 30 input data
- Output – “0” value indicating the raw matter sale, respective “1” value for purchasing raw matter.

Conclusions

The investors from the financial world, in an extremely competitive environment, look for any advantage which could make possible the increase of their gains. The advantages offered by the neural models help investors in evaluating the timeliness.

Another reason for having used artificial neural networks is that the financial market is the best example for the misunderstandings between theoretical notifies and the real world. The neural model we used makes out a positive analysis of the financial market.

The prediction model leads to the increase of the financial market’s increase, using information of old prices of raw materials we have studied in the learning set and returning future estimations.

References

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[2] David M. Skkapura – *“Building Neural Networks”*, ACM Press, New York, Addison-Wesley Publishing Company, pp. 37 – 41, 1994