EFFECT OF DYNAMICAL PARAMETERS IN PRICE PREDICTION USING SOM CLASSIFICATIONS

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We consider the effect of dynamical parameters extracted from the tick-wise price time series upon price prediction. We assume that such dynamical effect is carried by local dimensionless parameters including the first and the second derivatives of the price time series. By adjusting the range to compute such dynamical parameters from the data, we have succeeded in extracting the best range and improved the rate of correct prediction compared to our previous result without dynamical effect.

Keywords: Dynamical parameters, Quadratic Least Square Estimate (QLSE), Price Prediction Generator, Tick-wise Price

1 Pattern Classification by Means of Dynamical Parameters

It is now widely known that tick-wise prices have strong correlation between adjacent times. This fact prompted us to construct a tick-wise price generator [1], where we utilized the best combination of technical indicators to predict the price range of a few ticks ahead of the predicting time. This method essentially uses the deviation of the current price from a certain average values of the prices over neighboring time steps and does not consider the velocity or the acceleration of the prices. In this work we incorporate the dynamical properties

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as a new set of indicators and utilize their patterns in order to predict the price range at near future.

We extract those dynamical parameters directly from the tick-wise time series, by using the quadratic least square method (QLSE) for each segment of the price time series of length n.

$$p(t) = \alpha + \beta t + \frac{1}{2}\gamma t^2 \qquad (1)$$

We define dimensionless dynamical parameters by using the price, velocity and acceleration parameters α , β , γ . Dimensionless parameters do not depend on the choice of the units of the price and the time thus expected to have a universal value.

There is one such parameter made of the variable (in our case, the price), its time derivative (velocity), and the second derivative (acceleration), which is called as F-number. The name comes from the similarity to the F-number often used in fluid mechanics representing the ratio of inertia of the fluid over the gravity defined as follows [2].

$$F = \frac{\beta^2}{\alpha \cdot \gamma} \qquad (2)$$

We also define another dimensionless number, T , following Ref. [3] that consists of time interval (t), distance (L), and velocity (v) as follows:

$$T = \frac{v \cdot t}{L} \qquad (3)$$

2. Results of Prediction Experiment

The picture of the hitting rate as a function of the predicted point ranging from 1-10 tick is shown in Fig.1, which shows that our new result performs better by 0.5-2%.

However, the new method using more than 10 ticks of history considerably ill-performs and the hitting rate further goes down as we increase the range of history and becomes random after the range reaches 20-30 tics.

References

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