5. Conclusion

In the economic and financial analysis, people always want to know where and when will changes and trends occur in a time series. In this research we propose the concept of change periods instead of the traditional change points for certain structure changed time series. We present an approach to detect change periods by partial cumulative sum of fuzzy statistics through which enable us to be aware of the beginning and the end of a trend in a time series. Therefore, correct decision can be made and appropriate action can be taken.

The application of fuzzy theory avoids the potential hazard of problems of over fitting which might occur in traditional analysis with single values. Through the use of fuzzy statistics, the change periods detecting approach we come up with in this paper is able to deal with the data with the property of fuzziness. Thus, the results we gained will be closer to the real world in practice.

The contribution of this paper is that we provide a new method to detect change periods. Through the change periods detection, we can find trends in a time series. The proposed algorithm also combined with the concept of fuzzy set. Comparison to the conventional methods, our approach has several advantages:

(1) Initial knowledge about the structure in the data is not required in our approach so that we can take full advantage of the model-free approach.
(2) We can select standards for change periods by controlling the parameters to detect suitable change periods and filter the noises in a time series.
(3) The fuzzy property of data can be handled in our approach.

Although the simulation and empirical results show that our approach of change periods detection is satisfactorily successful and can be generally applied, there are still things to be notified and problems to be solved.

(1) Because the change periods in this paper is designed to be an interval where the trends change, the stationary part time of a time series may be regarded as a change period.
(2) We do not understand how each parameter affects our results precisely yet, so we can do some further study on that.