

The automatic extraction of time series trend and periodical components with the help of the “Caterpillar”-SSA approach.

We study a problem of automatic extraction of additive time series components (trend and periodical components) and present a solution for the problem by means of the “Caterpillar”-SSA method. This method doesn’t require information about time series parametric model and allows processing noisy non-stationary time series. Also, applying this method you can extract amplitude-modulated harmonic components; this is an advantage in comparison with methods based on the Fourier decomposition.

By now, it has become a common practice to consider visual analysis of intermediate results as a base for interactive “Caterpillar”-SSA identification. The aim of this paper is to introduce an automation of the procedure of trend and periodicities identification/extraction. The automation of the posed problem solution is important not merely for dataflow processing. Results of the automated identification can be useful as well during interactive processing. Presented methods are controlled by settings of parameters and threshold values for criteria that lie in the base of these methods.

The “Caterpillar”-SSA approach is used for time series investigation in different areas, for instance, in meteorology, hydrology, sociology, economics, traffic analysis, wherever trend or periodic behavior can present. Developed methods can be employed for an automation of the investigation process for such time series. This paper can be helpful for people who want to use advantages of the “Caterpillar”-SSA approach in automatic mode. It can also be of use for people who are interested in new approaches to trend and periodical components extraction.