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ИССЛЕДОВАНИЕ SSA-МЕТОДА НА ОСНОВЕ КОМПЛЕКСНОГО  
ПРИМЕНЕНИЯ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ  
IT-BASED INVESTIGATION OF THE SSA METHOD

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БЕЛОРУССКО-РОССИЙСКИЙ УНИВЕРСИТЕТ

The main task of this paper is to describe implementation of the basic SSA method in Scilab package for time series analysis. It will help both to study SSA details and verify other SSA implementations.

Time series is an ordered sequence of values of a variable at equally spaced time intervals.

Time series models are used to perform the following tasks:

- to obtain an understanding of the underlying forces and structure that produced the observed data;
- to fit a model and proceed to forecasting, monitoring or even feedback and feedforward control.

Time Series Analysis is used for a number of applications: economic forecasting; sales forecasting; budgetary analysis; stock market analysis; yield projections.

Singular spectrum analysis (SSA) is a nonparametric spectral estimation method. It combines elements of classical time series analysis, multivariate statistics, multivariate geometry, dynamical systems and signal processing.

The areas where SSA can be applied are very broad: climatology, marine science, geophysics, engineering, image processing, medicine, econometrics. Hence, different modifications of SSA have been proposed and different methodologies of SSA are used in practical applications such as trend extraction, periodicity detection, seasonal adjustment, smoothing, and noise reduction.

The main algorithm of basic SSA consists of four main steps: embedding, singular value decomposition (SVD), eigentriple grouping and diagonal averaging.

Scilab is a mathematical package and a high-level, numerically oriented programming language. The language provides an interpreted programming environment, with matrices as the main data type. Scilab is an excellent tool for anyone to solve optimization problems.

Scilab is a free open source, cross-platform numerical computational package. Such combination of properties makes it very useful for beginning researchers. Besides, it adapts well to a programmer's tasks.