Prediction Models In Information Systems

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Abstact

In the field of education, like in other industries are automation work or modernization of information systems (is). Solution tasks to improve is significantly improve the quality of the educational process and management. These tasks in most cases require the expenditure of significant amounts of resources - temporary, labor, material, financial. In the creation of is, as in any project, always there is a risk of unjustified resource costs. Project financing is relatively inefficient is is carried out, as a rule, according to rule "funding with full recourse on the borrower". Here are the main risks remain with the borrower at the customer of the future ip. Knowing the forecast ic performance can fairly accurate to determine and economic indicators future is. It can be, for example, indicators of the cost of preparing a document, annual savings, economic efficiency, term cost recovery on ip, etc. Heterogeneity of information flows, proceeding in complex structures, is researched. The new structure of cooperating systems such as lorenz-chen - anomalous diffusion is submitted. The recurrent diagrams, characterizing the visual features of this structure (topology and texture), are obtained.

Key Words: prediction, anomalous diffusion, modeling, recurrent diagrams, chaotic system.

Analysis of data processing technology shows that there is a clear relationship the value of the performance indicator of the ip on the intensity of occurrence defects occurring on various stages and areas technological process of data processing is. Preliminary studies, carried out using cluster analysis methods showed that the main classes of defects in technology is data processing are defects in reliability, completeness and timeliness [5]. Defects can be various failures, failures various ic components. So, for example, it is downtime in operation of computer equipment, data transmission means, downtime due to performers, lag in the transfer of documents for processing, errors (distortions) alphabetic and numeric loading of document details, gaps in indicators in documents, etc. Defects have different nature and necessitate costs technological time for its discovery and correction. Cumulative time identifying and correcting defects is a significant amount and significantly reduces the value of the indicator ic performance. Considering the above conditions for building a model, it is advisable to use functional dependence between defects in data processing in technological is process and the value of the performance indicator is. Considering the calculation and analytical methods for estimating quality of ip, this dependence can be determined based on regression dependence [6]. In this case, the choice of the type of function of the dependent indicator, in our case is a performance indicator of the ic, from a set of values independent indicators for classes of is defects should be performed in such a way that the resulting linear dependency would be better approximation of functional dependence. Except moreover, when calculating the value dependent indicator, it is necessary to determine the values weight coefficients of the defining indicators, which are here the regression coefficients. Under this condition, the creation of an automated is or its modernization with a high degree of probability can end with a significant positive effect. But in this case creation of prediction quires very much quantity of datas, that is leads to loss of time and resources.in difference of existing models we will use the recurrent diagrams of dynamical systems, advantage of which is in using of small quantity of datas, wihout lossing of time.

Let us represent the model of interactions of a stochastic process with a chaos-like lorentz-chen type in the form [1]:

$$\dot{x} = (25\alpha + 10)(y - x) + D\varphi_{i+1},$$

$$\dot{y} = (28 - 35\alpha)x + (29\alpha - 1)y - xz, \quad (1)$$

$$\dot{z} = xy$$

$$\frac{8 + \alpha}{z - 3},$$

Where is proportional to the convection velocity; – temperature difference between ascending and descending flows; is the deviation of the vertical temperature profile from the linear parameter; , is a discrete stochastic equation of the form [1]:

$$\varphi_{i+1} = \sqrt{r}\zeta_{i} + [(1-\gamma\tau) + \sqrt{r}\xi_{i}]_{\varphi_i} \qquad (2)$$

Parametric resolution of mathematical models encounters some difficulties. Therefore, the study of such models, especially in experimental studies, is often implemented by processing the recorded signals produced by the systems.

A chaos-like system of the lorenz-chen type is simulated in the matlab/simulink software environment, points (actually -) represented by a scheme (fig.1a) with an attractor in the plane (fig.1,2) [1, 2].

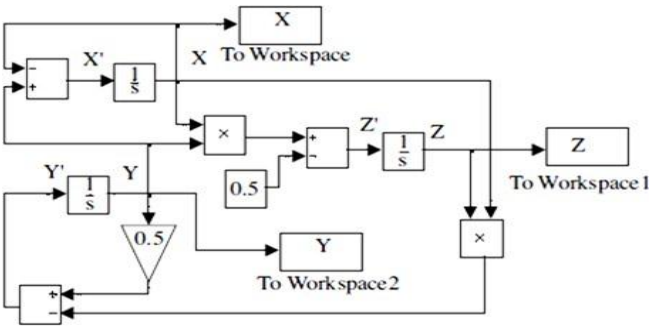

Figure 1. Structure Scheme

We display the additive component of the observed lorentz - chen processes - anomalous diffusion (fig. 2 a) on a square matrix, as:

$$G_{i,j} = \{\hat{x}_n\}_{n=0}^{N} \Rightarrow M \qquad (3)$$

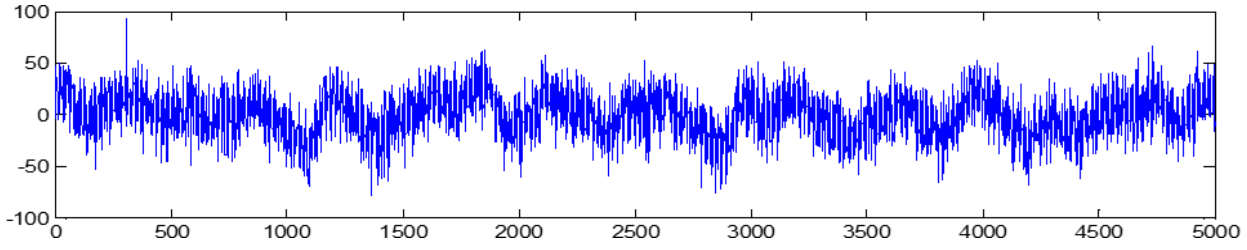

Figure 2. The Time Series Of The Lorentz-Chen System

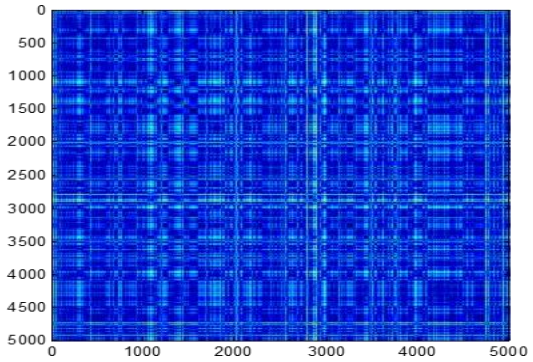

Figure 3.Recurrent Diagram Of The Lorentz-Chen System

Thus, as a result of the implemented algorithms, it turned out that the visual analysis of the recurrent diagram unambiguously showed the texture characterizing the chaotic process (a dense set of small dots), that is, a new chaotic lorentz-chen system - anomalous diffusion was formed.

Conclusion

The appearance of the recurrence diagrams proved the process with a slight predominance of anomalous diffusion elements. Based on the studies carried out, it was concluded that resonant excitations do not directly regulate the behavior of the analyzed system, but only form the mechanism of its self-organization, that is, the organization of new structures.

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