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ON ONE CLASS OF QUADRATIC STOCHASTIC OPERATORS CONSTRUCTED USING GIRAFFE.

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Abstract: In the article, the trajectories of quadratic stochastic operators built using a new construction are studied, and their fixed points and asymptotic fixed points are found. it is shown that quadratic stochastic operators are surjective quadratic stochastic operators and not.

Keywords: Population, diversity, simplex, reflection, Quadratic operators, Generation to generation, Voltero, density, cell, surjective, stochastic, original, frequency, genotype frequency, type, probability, hypothesis, allele, coefficient, construction, measurement, specialty

What kind of biological population? That is, we look at the closed relationship of organisms with each other. Let's assume that each specialty included in the population lies in one of the unique n varieties 1,2,3,...,n. ***i*** and ***j*** at the first step in the transition from the next generation to the next generation, let diversity k be determined with a single-valued probability. This probability (transition coefficient) $p_{ij,k}$ we define through It goes without saying that in this case the following conditions are fulfilled:

$p_{ij,k} \quad 0, \qquad \sum_{k=1}^{n} p_{ij,k} = 1$ all natural i, j, k for s.

The larger the population, the more likely it is to get the frequency. Then his condition $x = (x_1, x_2, ..., x_n)$ can be obtained as the probability of diversity, that is, the fraction of diversity i in the population xi. Then each appointed $x = (x_1, x_2, ..., x_n)$ for case parents pair i and $j \quad x_i x_j$ is formed with probability, therefore, at the next stage in the transition from generation to generation, the full probability

$$x_k^{'} = \sum_{i,j=1}^{n} p_{ij,k} x_i x_j \qquad (1)$$

is represented by a fotmula.

$S^{n-1} = \{x = (x_1, x_2, ..., x_n) : x_i \quad 0, \quad i=1,2,...,n, \sum_{i=1}^{n} x_i = 1\}$ full $n-1$ - it is called a simplex with an ochovy. It goes without saying $\sum_{k=1}^{n} x_k^{'} = 1$ va $x_k^{'} \quad 0$ will be. Then (1) reflection S^{n-1} is called a self-reflecting quadratic stochastic operator of a simplex. Among the mathematical modules, those whose moduli are quadratic operators play the main role [1].

The basic problem in quadratic operators is to study the trajectory of quadratic operators. This problem is presented in many scientific works. [2]; The study of ergodic properties

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of quadratic operators is presented in [3,4]. [3] The class of quadratic processes related to quadratic operators is defined in scientific works. Similarly, Markov processes related to linear operators are defined.

In this article, we present a general construction of quadratic stochastic operators.

Let's assume (Λ, L) be a periodic finite graph without multiple edges. Here Λ - the set of vertices of the graph, and L- edges are spherical.

Φ - and let there be a finite set of alleles. Reflection $\sigma : \Lambda \to \Phi$ called a cell. Ω- called a cell. $S(\Lambda, \Phi)$ Ω called a cell. $S(\Lambda, \Phi)$ called a cell. Λ_i - s (Λ, L) - is the set of all connected pieces of a graph, i=1,2,3,…,n. For optional two cells σ_1, σ_2 Ω for s

$$A(\sigma_1, \sigma_2) = \{x \quad \Lambda : \ \sigma_1(x) = \sigma_2(x)\}$$

and $\widehat{A}(\sigma_1, \sigma_2) = \bigcup_{j: A(\sigma_1,\sigma_2) \cap \Lambda_j \neq \varnothing} \Lambda_j$

If $\tilde{A}(\sigma_1, \sigma_2)$ if so, then

$$\Omega\left(\Lambda, \widehat{A}(\sigma_1, \sigma_2)\right) = \left\{\sigma \in \Omega : \sigma_{\widehat{A}(\sigma_1,\sigma_2)} = \sigma_{1_{\widehat{A}(\sigma_1,\sigma_2)}} \ yoki \ \sigma_{\widehat{A}(\sigma_1,\sigma_2)} = \sigma_{2_{\widehat{A}(\sigma_1,\sigma_2)}}\right\},$$

$\widehat{A}(\sigma_1, \sigma_2) = \varnothing$ just in case

$$\Omega\left(\Lambda, \widehat{A}(\sigma_1, \sigma_2)\right) = \left\{\sigma \in \Omega : \sigma_{\Lambda_j} = \sigma_{1_{\Lambda_j}} \ yoki \ \sigma_{\Lambda_j} = \sigma_{2_{\Lambda_j}}, \quad j=1,2,3\ldots,n.\right\},$$

Let's assume μ $S(\Lambda, \Phi)$ - Ω defined in $\mu(\sigma) > 0$ defined in σ Ω coefficient of transition from generation to generation for the cell $P_{\sigma_1\sigma_2,\sigma}$ we define as follows:

$$p_{\sigma_1\sigma_2,\sigma} = \left\{ \begin{array}{ll} \dfrac{\mu(\sigma)}{\mu\left(\Omega\left(\Lambda, \widehat{A}(\sigma_1,\sigma_2)\right)\right)} & if \ \sigma \in \Omega\left(\Lambda, \widehat{A}(\sigma_1,\sigma_2)\right) \\ 0 & for \ the \ remaining \ cases \end{array} \right\} (2)$$

$S(\Lambda, \Phi)$ quadratic stochastic operator V constructed using the coefficient of transition from generation to generation (2) acting in a simplex is defined as follows: optional λ $S(\Lambda, \Phi)$ for measurement $V\lambda = \lambda'$ $S(\Lambda, \Phi)$ dimension is an optional cell σ Ω for

$$\lambda'(\sigma) = \sum_{\sigma_1, \sigma_2 \ \Omega} P_{\sigma_1\sigma_2,\sigma} \lambda(\sigma_1)\lambda(\sigma_2) \qquad (3)$$

It is expressed by the equation.

It can easily be seen that the intergenerational transmission coefficient satisfies the following conditions:

$P_{\sigma_1\sigma_2,\sigma}$ o, $\sum_{\sigma \ \Omega} P_{\sigma_1\sigma_2,\sigma} = 1$ и $P_{\sigma_1\sigma_2,\sigma} = P_{\sigma_2\sigma_1,\sigma}$ everyone $\sigma_1, \sigma_2, \sigma$ Ω that's it.

Coefficient of transfer from generation to generation (2) (Λ, L) graph structure, set of alleles (spans) Φ and μ depends on the choice of measurement.

Definition. The quadratic operator (3) is called Voltero quadratic operator, if the coefficient of transition from generation to generation is defined as follows:

$$p_{\sigma_1\sigma_2,\sigma} = \left\{ \begin{array}{ll} if \ non{-}zero \ \sigma = \sigma_1 yoki \ \sigma = \sigma_2 \ if \\ 0 \qquad for \ the \ remaining \ cases \end{array} \right.$$

Theorem 1. If $|\Phi| > 1$ and $|\lambda| > 1$ (3) for a quadratic stochastic operator to be a Voltero-type quadratic stochastic operator, it is necessary and sufficient for the -graph to be a connected graph.

Proof. Let's assume (Λ, L) - Let the graph be a connected graph: If $A(\sigma_1, \sigma_2) = \Lambda$ then it is self-evident that $\Omega(\Lambda, \tilde{A}(\sigma_1, \sigma_2)) = \{\sigma_1\}$ will be. If $A(\sigma_1, \sigma_2)$ Λ if and $A(\sigma_1, \sigma_2)$ if so, then $\tilde{A}(\sigma_1, \sigma_2) = \Lambda$ from here $\Omega(\Lambda, \tilde{A}(\sigma_1, \sigma_2)) = \{\sigma_1, \sigma_2\}$ it follows that at the end, if $\tilde{A}(\sigma_1, \sigma_2)$ if so, then from the giraffe's connection $\Omega(\Lambda, \tilde{A}(\sigma_1, \sigma_2)) = \{\sigma_1, \sigma_2\}$ it follows that, and from this σ σ_1, σ σ_2 for s $P_{\sigma_1\sigma_2,\sigma} = 0$, that is, the quadratic stochastic operator corresponding to it is a quadratic stochastic operator of Voltero type.

Now let us assume that the quadratic stochastic operator (3) is a quadratic stochastic operator of Voltero type. Then it's optional σ_1, σ_2 for s μ the measurement is a positive density measurement and $\Omega(\Lambda, \tilde{A}(\sigma_1, \sigma_2)) = \{\sigma_1, \sigma_2\}$ we will have that, and this (Λ, L) shows the dependence of the graph. The theorem was proved.

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