

ARTIFICIAL INTELLIGENCE TECHNIQUES IN BREEDING

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This paper reviews the artificial intelligence methods used in breeding. The papers in which the classical statistical methods and methods based on artificial intelligence were compared are considered. The main problems that hinder the introduction of methods based on artificial intelligence are identified and the ways to solve them are proposed.

Keyword: artificial intelligence, machine learning, selection, genetics.

REFERENCES

1. Akdemir D., Sanchez J.I., Jannink J.-L. Optimization of genomic selection training populations with a genetic algorithm // *Genet Sel Evol.* 2015. V. 47. № 1.
2. Purbarani S. C., Wasito I., Kusuma I. Adaptive genetic algorithm for reliable training population in plant breeding genomic selection // 2016 International Conference on Advanced Computer Science and Information Systems (ICACSIS): IEEE, 2016.
3. Holland J.H. Adaptation in natural and artificial systems. An introductory analysis with application to biology, control, and artificial intelligence. London: Bradford book edition, 1994. 211 p.
4. Azimzadeh M. etc. Computer aided selection in breeding programs using genetic algorithm in MATLAB program // *Span J Agric Res.* 2010. V. 8. № 3. P. 672.
5. Grinberg N. F., Orhobor O. I., King R. D. An evaluation of machine-learning for predicting phenotype: studies in yeast, rice, and wheat // *Mach Learn.* 2019. V. 109. № 2. Pp. 251-277.
6. Khaki S., Khalilzadeh Z., Wang L. Predicting yield performance of parents in plant breeding: A neural collaborative filtering approach // *PLoS ONE.* 2020. V. 15. № 5.
7. Gianola D. etc. Predicting complex quantitative traits with Bayesian neural networks: a case study with Jersey cows and wheat // *BMC Genet.* 2011. V. 12. № 1. P. 87.
8. Xiong X. etc. Panicle-SEG: a robust image segmentation method for rice panicles in the field based on deep learning and superpixel optimization // *Plant Methods.* Springer Science and Business Media LLC. 2017. V. 13. № 1.
9. Lu H. etc. Fine-grained maize tassel trait characterization with multi-view representations // *Computers and Electronics in Agriculture.* Elsevier BV. 2015. V. 118. Pp. 143-158.
10. Rusanov I.A., Pavlyuk N.T., Vaschenko T.G., Goleva G.G. *Neyronnaya set' kak sposob klassifikatsii iskhodnogo materiala ozimoy pshenitsy* [Neural network as a way to classify the source material of winter wheat] // *Bulletin of the Voronezh State Agrarian University.* 2010. No. 3. Pp. 27-31.
11. Wasserman F. *Neyrokomp'yuternaya tekhnika: teoriya i praktika: per. s angl.* YU.A. Zuyeva, V.A. Tochenova [Neurocomputer technology: theory and practice: translated from English by Yu. A. Zuev, V. A. Tochenov]. 1992. 184 p.
12. Gerlai R. Phenomics: fiction or the future? // *Trends in Neurosciences.* Elsevier BV. 2002. V. 25. № 10. Pp. 506-509.
13. Bondarenko V.Yu. *Analiz fenotipa dekorativnykh rasteniy s ispol'zovaniyem iskusstvennykh neyronnykh setey: Opredeleniye taksonomicheskikh i fiziologicheskikh kharakteristik* [Analysis of

the phenotype of ornamental plants using artificial neural networks: Determination of taxonomic and physiological characteristics] // Journal of the Belarusian State University. Biology. No. 1. Pp. 25-32.

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