Formation of a classification map of the underlying surface from images of a coherent locator

O.N. Skrypnik[1], B.V. Lezhankin[1], A.N. Malov[1], B.M. Mironov[1], S.F. Galliev[1]
[1]Irkutsk Higher Military Aviation Engineering School (Military Institute)

Abstract:

Single-line, combined single-line and two-line algorithms for the formation of a classification map of the underlying surface were developed on the basis of the model of a system with a random, jump structure, and the said algorithms were studied by computer simulation method. The effectiveness of the algorithms, including the algorithms of selection of the boundaries of areas with different types of underlying surface, was evaluated by the value of the state recognition error when processing real images of coherent locators.

Keywords: coherent locator, computer simulation method, underlying surface, recognition error.

Citation: Skrypnik ON, Lezhankin BV, Malov AN, Mironov BM, Galliev SF. Formation of a classification map of the underlying surface from images of a coherent locator. Computer Optics 2006; 29: 151-159.

Acknowledgements: This work was supported by the Russian Foundation for Basic Research, RFBR grant No. 06-08-00596-a.

Access full text (in Russian)

References:

[1] Soifer VA, ed. Methods for computer design of diffractive optical elements. New York: John Willey & Sons Inc; 2002.
[2] Kazakov IE, Artemjev VM. The optimization of dynamic systems of random structure [In Russian]. Moscow: “Nauka” Publisher; 1980.
[3] Kondratenkov GS, Frolov AYu. Radio vision. Earth remote sensing radar systems [In Russian]. Moscow: "Radiotehnika" Publisher; 2005.
[4] Frost VS, Stiles JA, Shanmugan KS, Holtzman JC. A model for radar images and its application to adaptive digital filtering of multiplicative noise. IEEE Trans Pattern Anal Mach Intell 1982; PAMI-4(2): 157-165. DOI: 10.1109/TPAMI.1982.4767223.
[5] Arsenault HH, Denis M. Image processing in signal-dependent noise. Can J Phys 1983; 61(2): 309-317. DOI: 10.1139/p83-042.
[6] Lee JS. Speckle analysis and smoothing of synthetic aperture radar images. Computer Graphics and Image Processing 1981; 17(1): 24-32. DOI: 10.1016/S0146-664X(81)80005-6.
[7] Maslov OV, Sirota AA. Algorithms for selecting the boundaries of objects in images by the methods of detecting spatial disorder [In Russian]. Radioengineering 2005; 7: 97-101.
[8] Klekis ÈA. Optimal detection of discontinuous changes in the structure of discrete dynamic systems according to non-noise observations [In Russian]. In Book: Statistical problems of control. Vilnus: Institute of Mathematics and Cybernetics Academy of Sciences of the Lithuanian SSR Publisher; 1986; 73: 89-99.
[9] Yarlykov MS, Shvetsov VI. Optimal nonlinear estimation of Gaussian separable random fields in radio engineering problems [In Russian]. Radioengineering 1997; 1: 48-56.
[10] Bakut PA, Kolmogorov GS, Vornovitsiy IE. Image segmentation: threshold processing methods [In Russian]. Zarubegnaja Radioelektronika 1987; 10: 6-24.
[11] Klekis ÈA. Optimal filtering in systems with random structure and discrete time [In Russian]. Avtomatika i Telemekhanika 1987; 11: 61-69.
[12] Bystrov RP, Kuznetcov EV, Sokolov AV, Chesnokov YuS. Modern radar and signal processing systems [In Russian]. Achievements of Modern Radioelectronics 2005; 9: 11-28.
[13] Gonzalez RC, Woods RE. Digital image processing. 3rd ed. Pearson Education; 1992. ISBN: 978-0-201-60078-0.
[14] Verdenskaya NV. Image segmentation – statistical models and methods [In Russian]. Achievements of Modern Radioelectronics 2002; 12: 33-47.