The method of selection of the central lines of blood vessels in diagnostic images

N.Y. Ilyasova[1,2], A.O. Korepanov[1,2], P.M. Chikulaev[1,2]
[1]Image Processing Systems Institute of the RAS,
[2]Samara State Aerospace University (SSAU)

Abstract

The paper presents a method of isolating the central lines of blood vessels in biomedical diagnostic images, based on the use of global optimization methods applying the shortest-path search algorithm according to the Dijkstra graph. The optimized functional is formed on the basis of an indistinct directional field based on the original image.

Keywords: blood vessels, biomedical diagnostic image, algorithm according to the Dijkstra graph, original image

Citation: Ilyasova NY, Korepanov AO, Chikulaev PM. The method of selection of the central lines of blood vessels in diagnostic images. Computer Optics 2006; 29: 146-150.

Acknowledgements: This work was supported by the Russian-American program “Basic Research and Higher Education” (BRHE), the program of the Presidium of the Russian Academy of Sciences “Basic Sciences for Medicine” and grants from the RFBR No. 06-07-08006-ofi, No. 05-01-08020-ofi_n.

Access full text (in Russian)

References:

[1] Soifer VA, Kotlyar VV, Khramov AG, IlyasovaNYu, Kuprianov AV, Korepanov AO, Kovalev AA, Ustinov AV. Computer system for early diagnosis of eye diseases based on the analysis of fundus images [In Russian]. Proc Conf "Fundamental Sciences for Medicine" 2004: 131-137.
[2] Rueckert D, Burger P, Forbat SM, Mohiaddin RD, Yang GZ. Automatic tracking of the aorta in cardiovascular MR images using deformable models. IEEE Trans Med Imaging 1997; 16(5): 581-590. DOI: 10.1109/42.640747.
[3] Cronemeyer J, Heising G, Orglmeister R. A fast skeleton finder for parallel hardware. Proc Computers in Cardiology 1992: 23-26. DOI: 10.1109/CIC.1992.269456.
[4] Ilyasova NYu, Ustinov AV, Khramov AG. Methods for analyzing dactyloscopic images based on the field of directions [In Russian]. Nauchnoe Priborostroenie 1993; 3(1): 89-101.
[5] Soifer VA, Khramov AG, Korepanov AO. Fuzzy direction field method for fringe and tree-like patterns analysis. Proc 17th Int Conf Patt Recogn (ICPR) 2004; 2: 779-782. DOI: 10.1109/ICPR.2004.1334374.
[6] Soifer VA, Kotlyar VV, Khonina SN, Khramov AG. The method of the directional field in the interpretation and recognition of the images with structure redundancy. Pattern Recognit Image Anal 1996; 6(4): 710-724.
[7] Source: http://citeseer.ist.psu.edu/kirbas00review.html.
[8] Dijkstra EW. A note on two problems in connexion with graphs. Numerische Mathematik 1959; 1(1): 269-271. DOI: 10.1007/BF01386390.
[9] Soifer VA, ed. Methods for computer design of diffractive optical elements. New York: John Willey & Sons Inc; 2002.
[10] Korepanov AO. Extraction of central lines in diagnostic images of vessels using methods of wavelet analysis and differential geometry. Pattern Recognit Image Anal 2005; 15(4): 636-639.
[11] Cormen TH, Leiserson ChE, Rivest RL, Stein C. Introduction to algorithms. 2nd ed. Cambridge, London: MIT Press; 2001: 595-601. ISBN: 978-0-262-03293-3.