

1-1-1977

Computer Location of Drainage Networks by an Interactive Line Following Algorithm

L. Montoto

Follow this and additional works at: http://docs.lib.purdue.edu/lars_symp

Montoto, L., "Computer Location of Drainage Networks by an Interactive Line Following Algorithm" (1977). *LARS Symposia*. Paper 213.

http://docs.lib.purdue.edu/lars_symp/213

This document has been made available through Purdue e-Pubs, a service of the Purdue University Libraries. Please contact epubs@purdue.edu for additional information.

Reprinted from

**Symposium on
Machine Processing of
Remotely Sensed Data**

June 21 - 23, 1977

The Laboratory for Applications of
Remote Sensing

Purdue University
West Lafayette
Indiana

IEEE Catalog No.
77CH1218-7 MPRSD

Copyright © 1977 IEEE
The Institute of Electrical and Electronics Engineers, Inc.

Copyright © 2004 IEEE. This material is provided with permission of the IEEE. Such permission of the IEEE does not in any way imply IEEE endorsement of any of the products or services of the Purdue Research Foundation/University. Internal or personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution must be obtained from the IEEE by writing to pubs-permissions@ieee.org.

By choosing to view this document, you agree to all provisions of the copyright laws protecting it.

COMPUTER LOCATION OF DRAINAGE NETWORKS BY AN INTERACTIVE LINE FOLLOWING ALGORITHM

L. MONTOTO

IBM Scientific Center, Paseo de la Castellana, 4 - Madrid 1, Apartado 179, Spain

An algorithm is described designed to locate and connect linear features with identical characteristics on multispectral images. The input is a map of magnitudes ($PM(i,j)$) and line orientations ($PR(i,j)$) produced by an edge and curve detection algorithm which uses a window of 5×5 pixels centered at every pixel belonging to an edge and looks for a preferred line in that pixel along 0° , 45° , 90° or 135° ($PR=1,2,3,4, \dots PR=5$ means indetermined orientation). Noisy results coming from the local line detection operation are avoided using a radiometric corrected input image on a combination of bands together with an appropriate threshold.

To run the algorithm the user selects a starting pixel k and gives a sign to the value PR_k to choose a direction ($D_k=1,2, \dots, 8$ for $D_k=+PR_k$). The algorithm looks for the next pixel $k+1$ in the direction $D_{k+h} \text{ mod } 8$ ($h=0,1,2,3$) using the criteria: 1) $PM_{k+1} = PM_k \pm \epsilon$ (being ϵ chosen by the user) and 2) Distance (PM_k, PM_{k+1}) be a minimum. Being $PM_k > 0$ and $PR_k = n$ ($n=1,2,3,4$) the $k+1$ pixel could have $PM_{k+1} \geq 0$ and $PR_{k+1} = m$ ($m=0,1, \dots, 5$) giving rise to three different cases that will be discussed. Range of neighborhood is fixed by the user in a compromise between getting good results in broken lines or a pitfall if the algorithm jumps from one chain to other.

Having the values PM and PR in memory the algorithm lasts 30 to 70 ms/pixel in the final chain (in PL/1 for an IBM 360/65) depending on degree of discontinuity and number of nodes. Results obtained from LANDSAT images to locate the drainage network of the Guadarrama river in Central Spain will be presented.