II-19 A CONCEPT ON BASIN MESH DRAINAGE DIRECTION DETERMINATION

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ABSTRACT: Basin mesh drainage directions were determined by utilization of digitized elevation data which is formatted in common form as square regular grid and has size about 250 m or one-fourth of the third mesh map. This concept firstly, extracted pits, grid points which their drainage directions can not be found by using maximum descent algorithm due to their elevations are lower than their all neighbors, from original matrix of data and flow directions of these pits were found seperately by guidance of channel lines.

INTRODUCTION

Drainage networks of the basin are the fundamental concepts in hydrology, especially, for physically-based distributed runoff model which requires spatial variations of many parameters. At present, the availibility of digitized elevation data is increasing rapidly and provides the topographic information for basin, this reflects to various digital elevation model (DEM) are being developed to find the drainage direction network of the basin. The same problem of all digital elevation models is the drainage directions of pits which can not be determined directly, to overcome this problem, such as, **O'Callaghan and Mark**(1984) proposed elevation data smoothing by implementing a weighted average of considering pit and its eight neighbors until the elevation spills into the next lowest elevation, **Marks, Dozier and Frew**(1984) solved this troublesomeness by preprocessing the handling elevation data (for details see ref.). In, present model, the directions of flow from pits are found by applying the directions of channel lines.

METHODOLOGY

With the fact that almost pits lie along clear channel lines or can be said that pits are local minima along the channel lines, so, the flow directions of channel points can guide to obtain the reasonable flow directions of pits. The procedure are divided into 4 steps and expressed as follows:

STEP 1: Channel pixel nomination

This step was done by applying the simple **Puecker and Douglas**'s(1975) algorithm to mark upward concave for channel points and go like this, for 3 X 3 window system as shown in Fig.1, the elevation of considering P_0 and its 3 neighbors P_1, P_7 and P_8 are intercompared, the highest elevation is marked as not channel points. When this algorithm is applied cover whole matrix of data, only unmarked points will be considered as channel points.

P_4	P_3	P_2
P_5	P_0	P_1
P_6	P_7	P_8

Fig.1 3 X 3 window system

STEP 2: Channel line thinning

The nominated channel lines was thinned to be one-pixel-wide lines by applying the thinning algorithm which is similar to the one that described by **Rosenfeld and Kak** (1982), the algorithm is iterative and local-parallel. The procedure will delete the border points which are not end points and the deletion must preserve 8-connectedness of their neighbors. In order to keep the thinned lines at medial lines, each iteration is divided into 4 subcycles and each subcycle deletes only north, south, east and west border points, respectively.

STEP 3: Channel system decoration

In this model, only channels that contain pits and isolated pits are kept, isolated non-pits and channel segments that not contain pits will be deleted.

STEP 4: Channel point connection

The directions from non-pits were determined directly by applying maximum descent algorithm while drainage directions of pits were found by using the guidance of channel flow directions, however, some additional informations, such as, channel priority was taken into account after checking result closely. Flow directions of isolated pits were assigned to their lowest neighbors. Finally, after proximate check the result step by step, uncomputable directions were defined by whole basin drainage pattern observation.

RESULT AND CONCLUSION

This concept for drainage direction networks seem to be easy because the directions of pits are determined seperately from the original pattern and the result of pit flow direction connection compares to channel networks obtained from map are shown in Fig.2 and Fig.3 ,respectively.

REFERENCE

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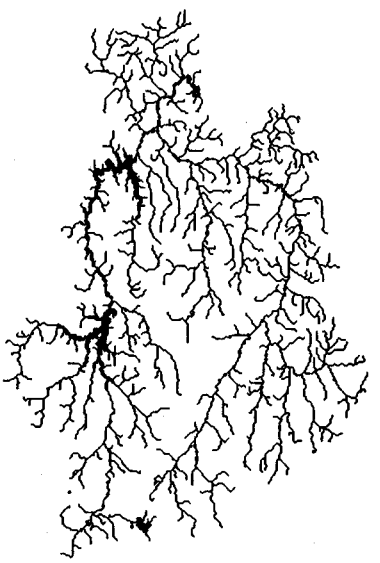

Fig.2 Synthesized channel network

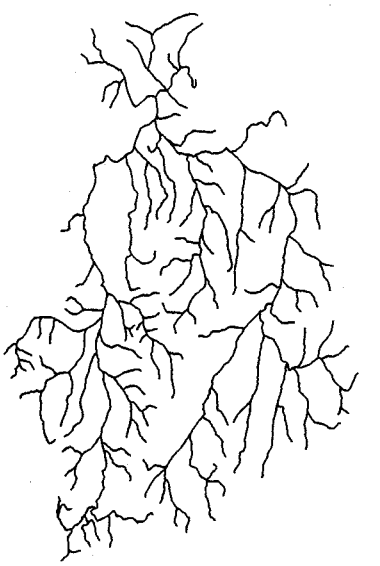

Fig.3 basin river network map 1:200,000