

## PATTERN RECOGNITION AND TYPIFICATION OF DITCHES

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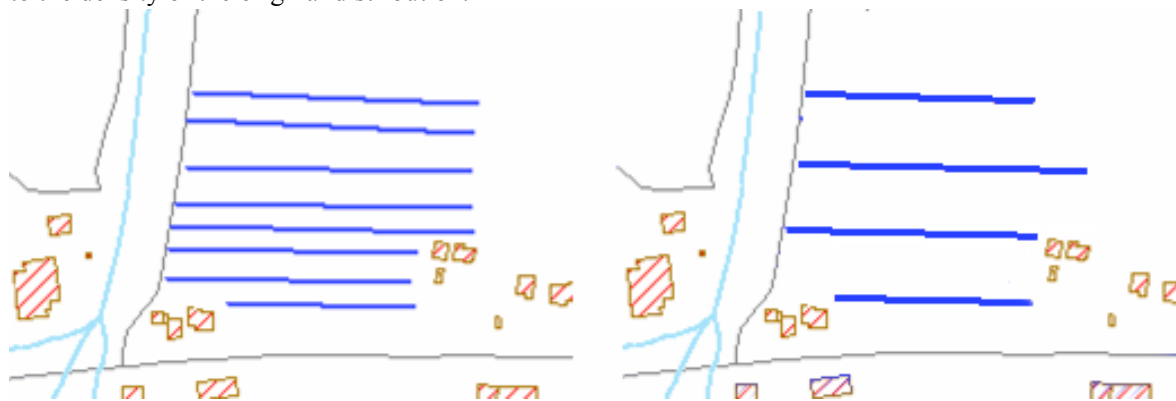
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This paper will present a novel algorithm for the typification of ditches. Ditches are man-made features typical of the rural environment; they are usually dug following regular shapes and one of their most evident characteristic is that they are usually found in groups, running one parallel to each other. Because of their regular shape, their presence in groups and their distribution in spatial patterns, ditches lend themselves to be generalized through typification.

So forth, typification has been mainly applied to buildings and roads; the application of a typification algorithm to ditches provides a more flexible way to generalize them with respect to simplification; moreover the simplicity of the algorithm may make it suitable to be extended to other uses (e.g. grid alignments).

The algorithm performs mainly two actions: pattern recognition and typification and this is achieved in three steps: recognizing the groups of ditches that can be generalized together, detecting the characteristics of the group as direction and extension, and drawing the new ditches, maintaining the spatial pattern of the original geometries. The first part of this task is achieved segmenting the ditches in almost-straight sections and grouping them by proximity and direction; then the extension of a group of ditches is detected calculating a special envelope, the "cluster envelope". The typified ditches will be drawn as regular spaced segments lying inside the "cluster envelope": the idea behind this is to consider the "cluster envelope" as a sort of "canvas" in which it is possible to draw freely the typified ditches. The ditches are then drawn trying to minimize the conflicts with nearby objects, eventually moving the whole group of typified geometries to make it fit best the space available.

This algorithm was developed in the frame of the CARGEN project, a research project at the Department of Information Engineering of the University of Padua in cooperation with the Italian NMA, the IGMI (Istituto Geografico Militare Italiano) and the Regione Veneto with the aim to design algorithms for the automatic generalization of the IGMI DB25 geodatabase in 1:25000 scale from the regional GeoDBR geodatabase in 1:5000 scale. The algorithm was tested on two datasets, describing a montaneous and a flat territory. The algorithm performed very well, reducing the number of ditches and maintaining a good representation of the original patterns. Nevertheless some improvements are currently being developed, the first of them to let the algorithm use a variable spacing between the typified ditches, adapting it according to the density of the original distribution.



In the image: left source data, right typified data.