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Threshold Selection for Line Detection Algorithms

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THRESHOLD SELECTION FOR LINE DETECTION ALGORITHMS

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A line detector has been derived
which combines the advantages of existing
'non-linear' and 'semi-linear' methods.
It has been tested on Landsat data of S.E.
England where linear features are typi-
cally less than one pixel in width. Im-
proved results have been obtained in com-
parison with alternative methods.

Specification of an accurate thresh-
old value is essential for deciding
whether a pixel contains a linear feature
or not. This may be achieved using a
model which attempts to determine the
threshold value from the following pro-
perties:

1. The width of the linear feature
2. The spectral response of the
   linear feature
3. The spectral response of the back-
   ground cover type
4. The configuration of the line with
   respect to the pixel boundaries
5. Pixel overlap
6. Spatial autocorrelation in the
   pixel window used by the linear
   feature detector.

Results show that at any one thresh-
old, sections of very narrow lines may be
detected while sections of much wider
lines may be missed. Typically, in the
area studied, rivers as narrow as 10 m
wide may be detected under optimum con-
ditions whereas, using the same threshold,
sections of rivers as wide as 60 m were
not detected. Noise will therefore be
introduced into any detection process.
However, it is shown that this noise may
be reduced by post-processing and examples
are given which demonstrate that this is
most effective when information is com-
bined from line detectors applied at
different thresholds.