

Segmentation of strokes and their junctions at recognition of the hand-written text

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TEXT AS A BINARY IMAGE

Модель - не цель, а средство есть
Натуру мыслью схватить,
Её законы изучить
И улучшения произвести!

12 мая 1994. А.А.А.А.

мыслью

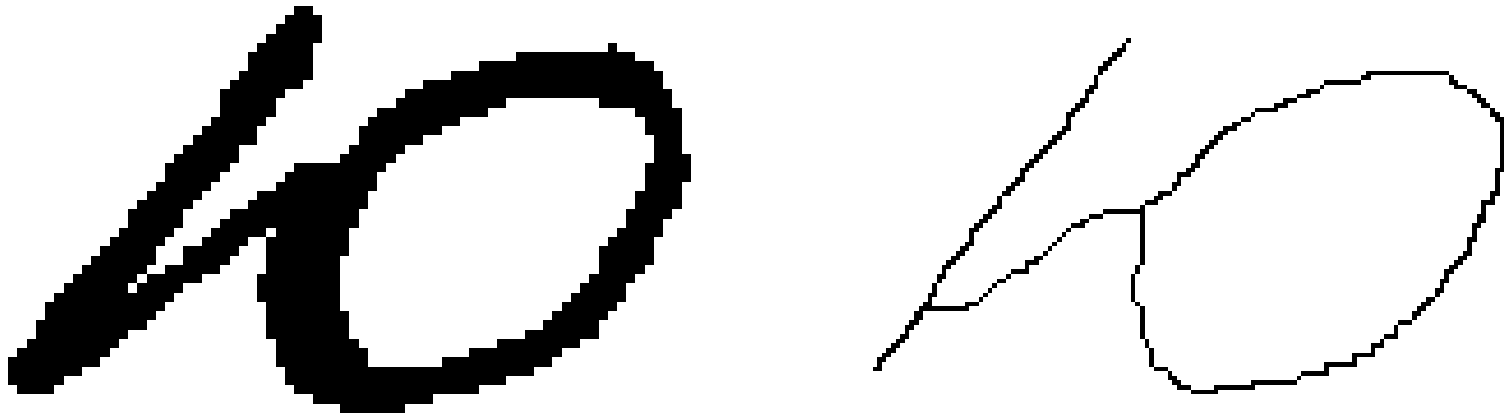
THE PROBLEM OF EXTRACTION OF SIMPLE ELEMENTS FROM THE IMAGE



The extraction of separate strokes is based on the analysis
of topological structure of the image.

Besides it is possible to use effectively features
of junction of strokes.

THE SKELETON OF THE IMAGE



The skeleton - the set of middle axes - allows to reveal the topology of an image.

For the raster skeleton it is difficult to find corresponding elements of border and skeleton.

THE METHOD SUGGESTED

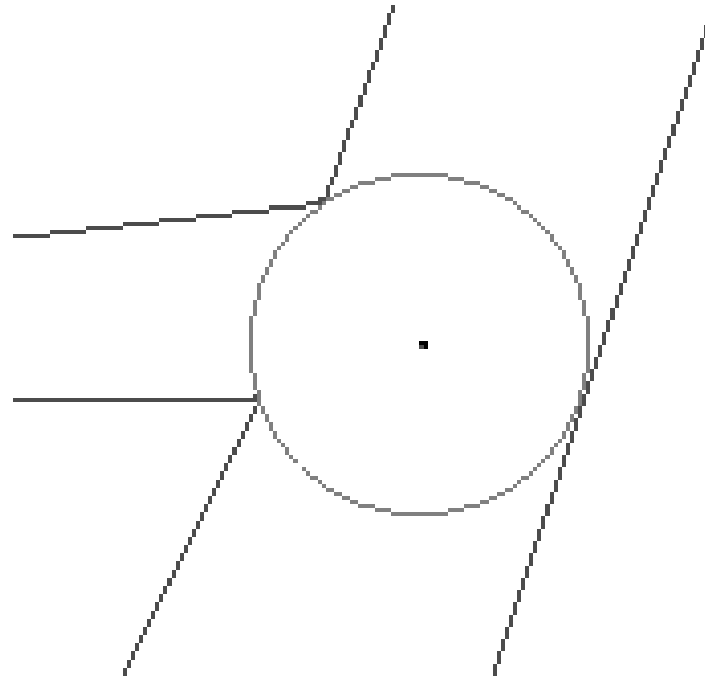
- To use continuous skeleton and continuous border
- To reveal smooth parts of a border and identificate segments of a skeleton and border for definition of features of junctions

THE CONTINUOUS BORDER



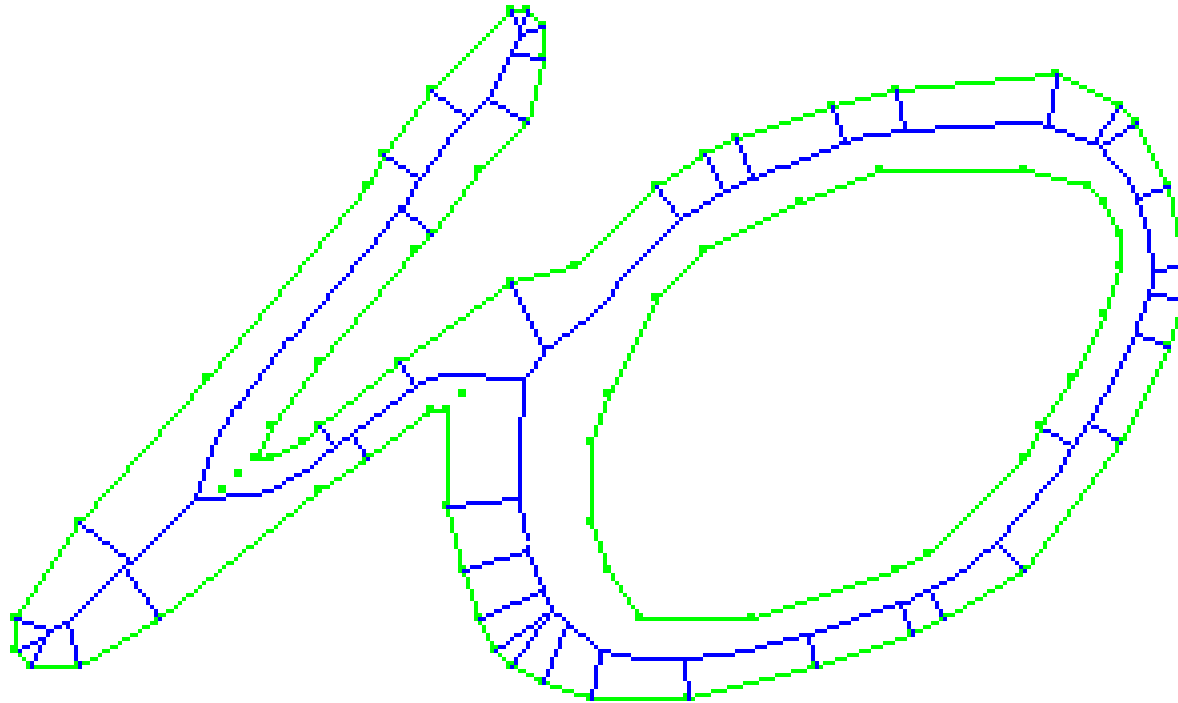
The border of a polygonal figure which divides black and white points
and has a minimal perimeter

THE EMPTY CIRCLE



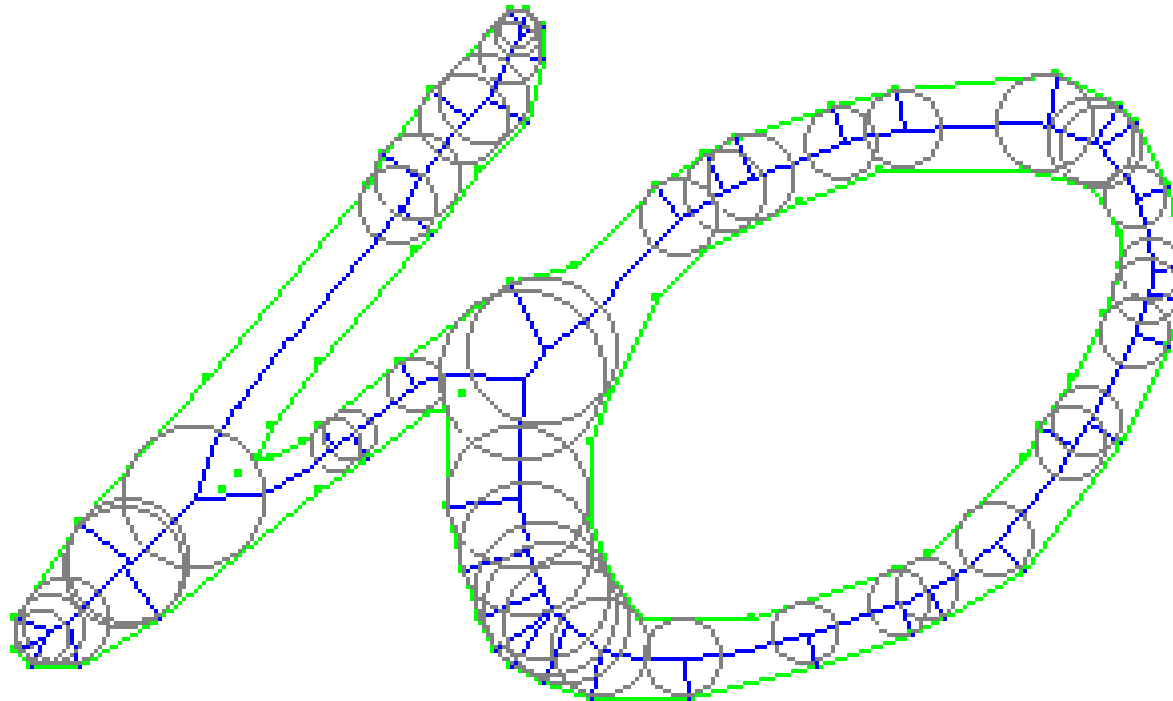
- lays inside the polygonal figure
- has 2 or more tangent points with the border

THE CONTINUOUS SKELETON



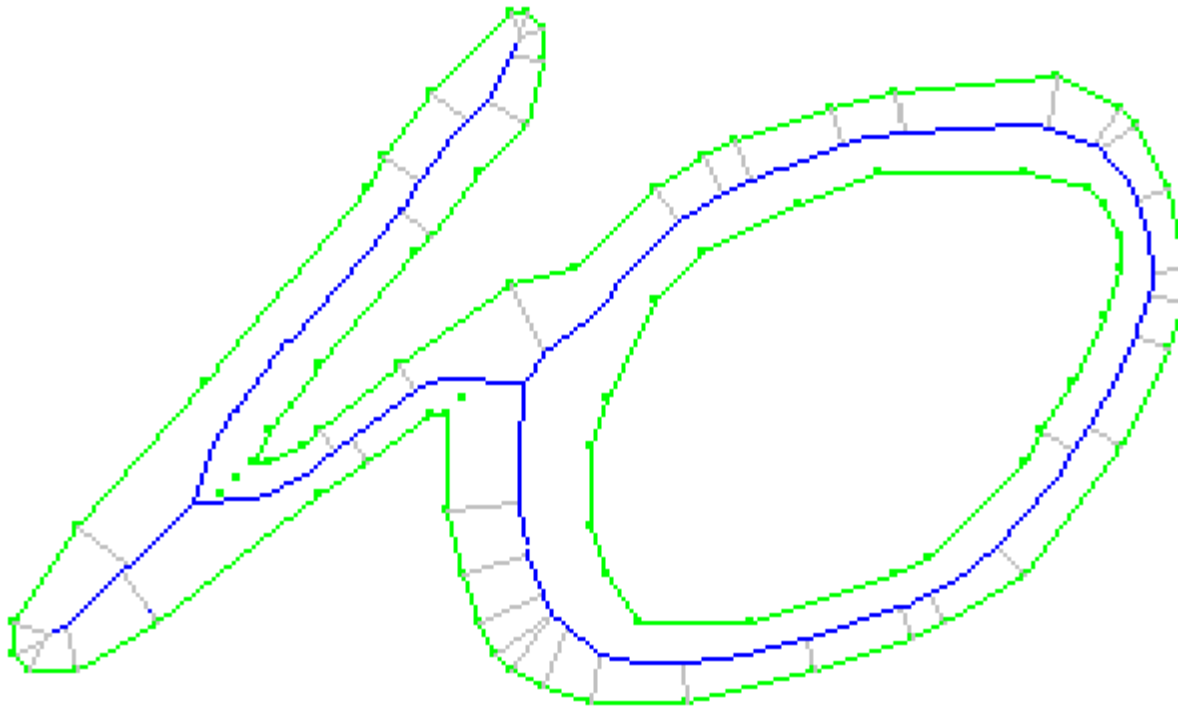
The skeleton is the set of the centres of empty circles

THE SKELETAL REPRESENTATION

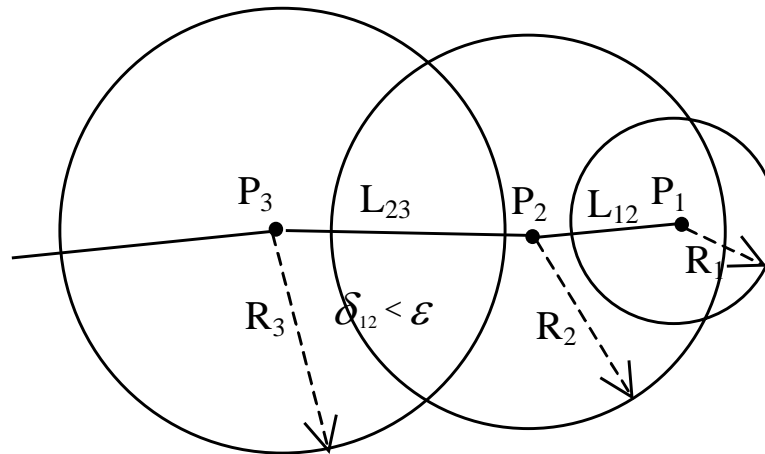


The skeleton with empty circles.

INESSENTIAL LINKS OF THE SKELETON



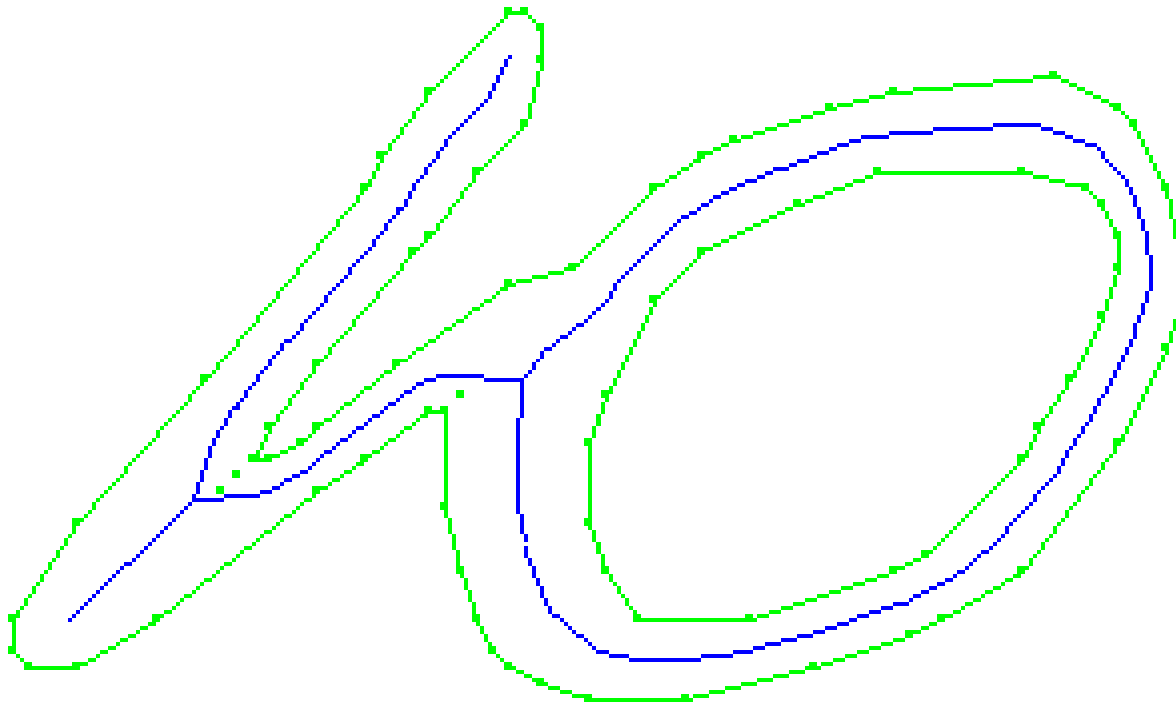
THE CUTTING



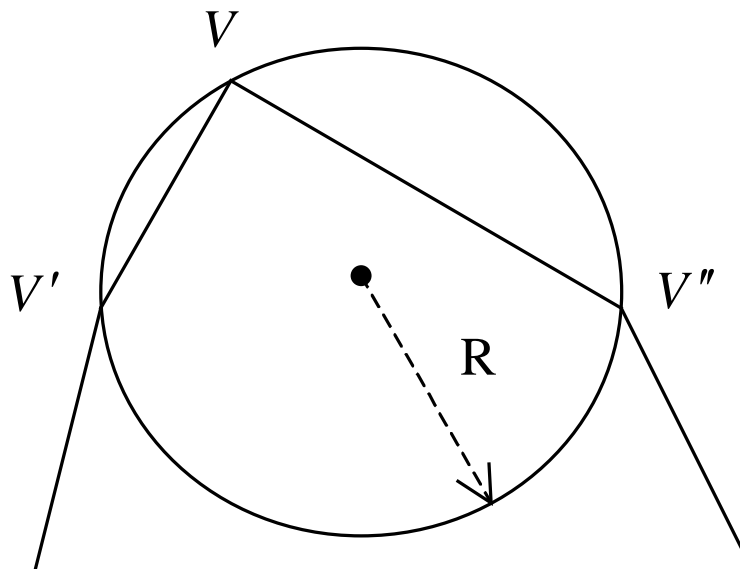
$$\delta_{12} = L_{12} + |R_2 + R_1|$$

If $\delta_{12} < \epsilon$, then $P_1 P_2$ can be removed

THE CUT SKELETON

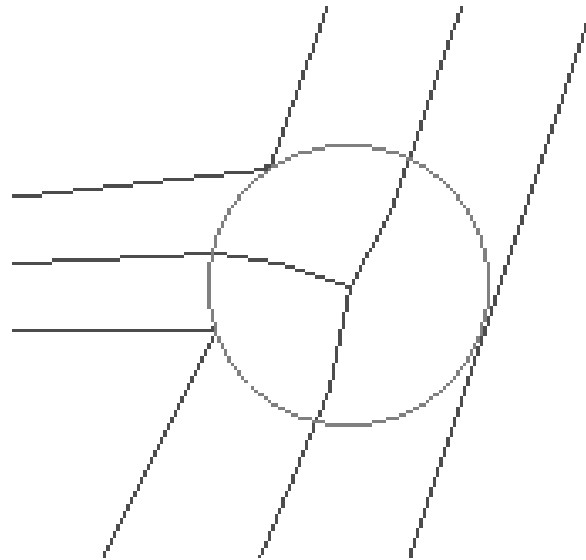


THE CRITERION OF A BREAK



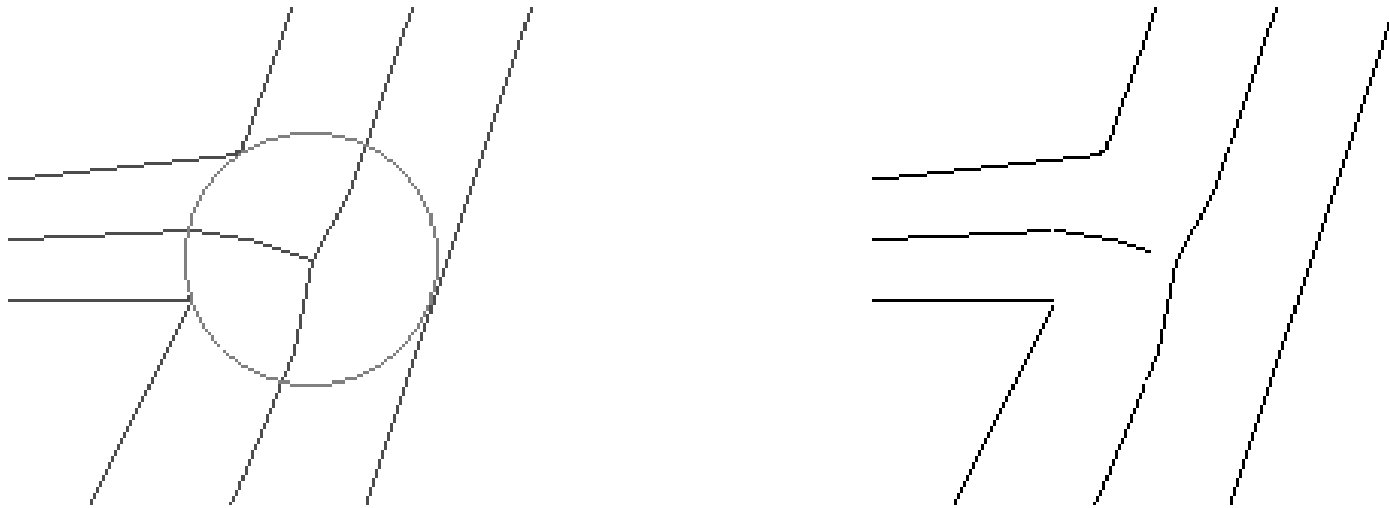
If $\frac{|V'V| + |VV''|}{R} > T$, then the border has a break at V

THE JUNCTION OF STROKES

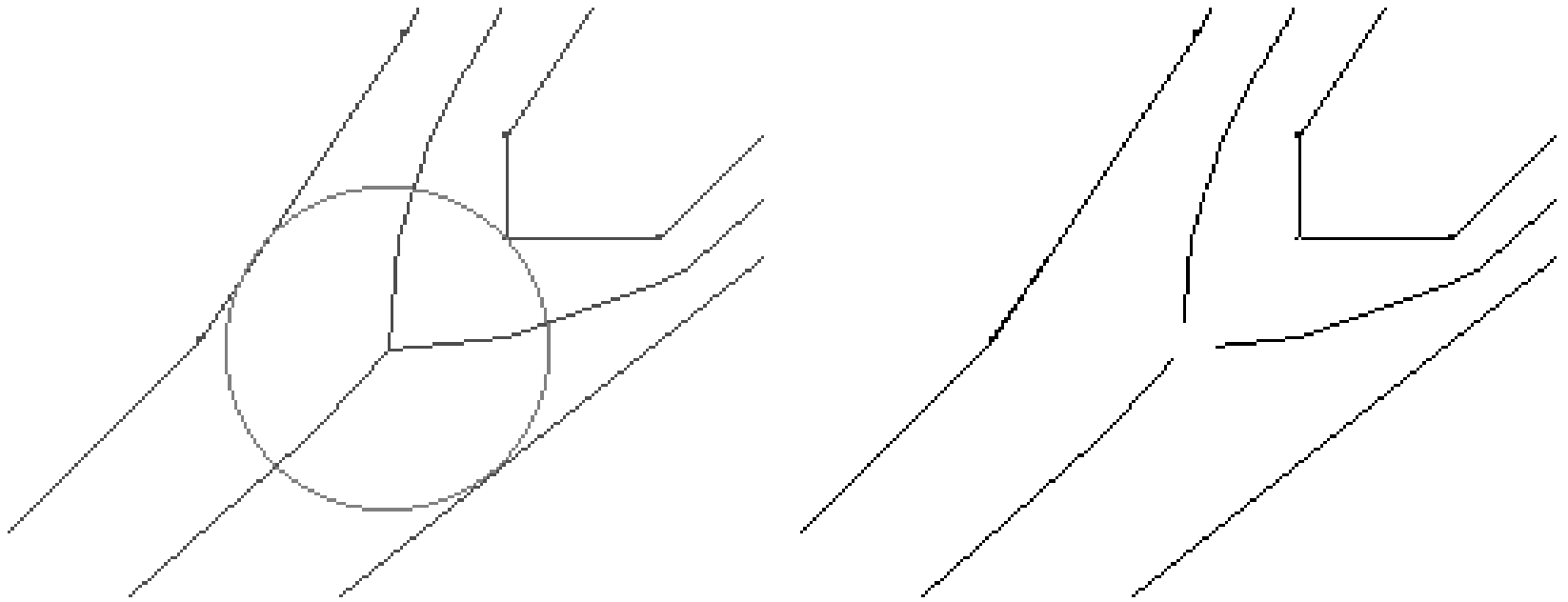


Each vertex with the degree higher than 3 is a junction of strokes

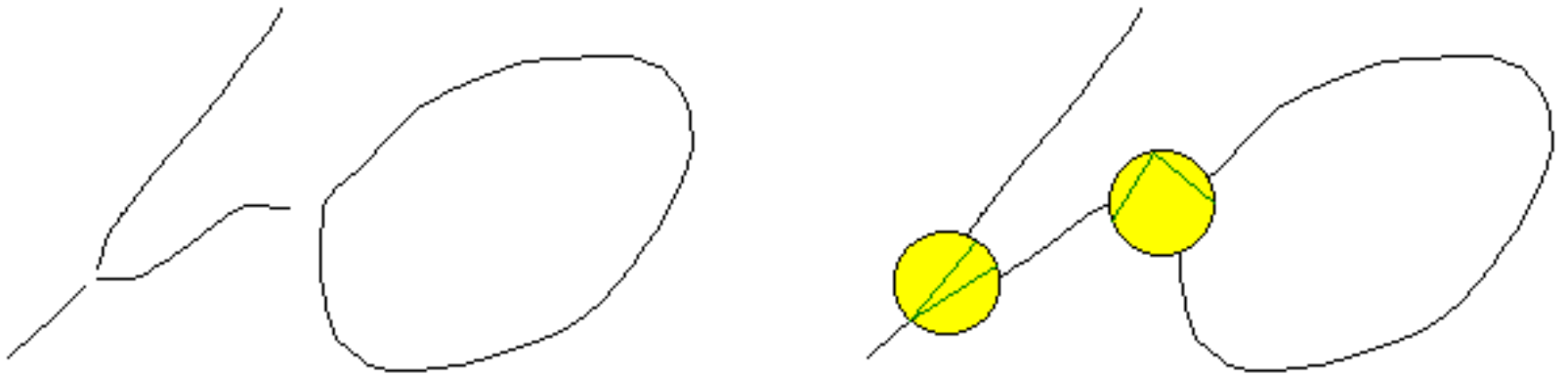
"CROSSING" JUNCTION



"INTERFACE" JUNCTION



THE RESULT



The set of strokes and junctions between them

CONCLUSION

The method suggested

- allows to represent a fragment of the hand-written text as a set of strokes and junctions between them
- uses effectively the information contained in the image of the word
- provides the most difficult part of segmentation

The representation of a word provides an opportunity of the further analysis of the image.