SRVC 2009 - ImageAnalyzer

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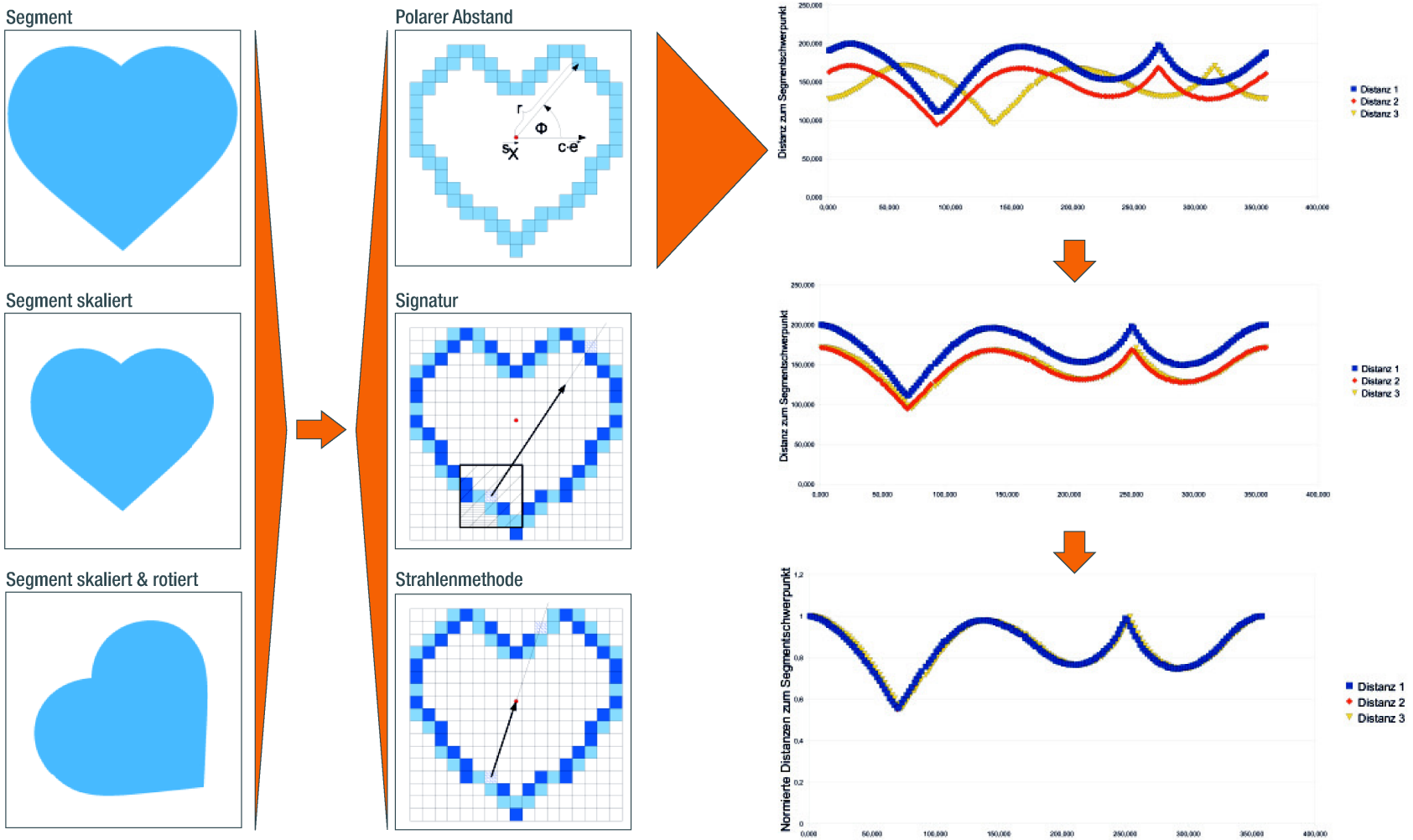
Idea of the program

- Each object in an image is composed of many patches (segments) with different shapes and colors.
- To recognize an object, it is necessary to find out, which segments are typical for which object and in which segment neighborhood they occur.
- If a typical segment in a characteristic neighborhood is found, this segment is part of a certain object.
- Typical adjacent segments for a certain object forming the whole object in the image.

Training phase, step 1

- In the first step, all downloaded training images are splitted in their segments by color.
- For each segment contour a feature vector is computed, invariant against rotation, scaling and translation.
- Therefore, three adapted methods are used: polar distances, contour signatures, and ray distances.

Contour Feature Vector



Training phase, step 1

- In order to reduce the number of feature vectors, a k-means clustering method is used.
- Each resulting cluster represents a set of similar feature vectors.

Training phase, step 2

- For all segments in one image, the clusters for each segment and its adjacent segments is computed and stored in a sample vector together with the object category of the image.
- This is done for all downloaded training images. With this sample vectors a decision tree model is trained.

Analyzing phase

- Each provided image is splitted in its segments by color and for all these segments the feature vector is computed.
- Each segment that could not be recognized with the cluster model is sorted out.
- For all of the remaining segments, the sample vector with the adjacent segments is computed and with the decision tree model, the object category is predicted.
- All the adjacent segments with the same predicted object category are composed to a compound segment. Each of this compound segments represent an object in the image.

Selection of one image for each object category

- The image with the biggest number of segments in a compound segment with the right object category is selected.
- In all the selected images the bounding box of the compound segment is drawn.
- All selected images are saved under the name of the category of the respective compound segment.