Lecture 5 - IP notes

Jannick Drews

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1 Pre-lecture

Preparation: read chapter 7 - Introduction book

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2 Lecture

2.1 BLOB analysis

2.2 Region growing

Thresholding + Component analysis.
Specifying a seed-point and then grow the region to threshold and do some component analysis.

2.3 Shapes

- Compactness
  $\frac{Area}{Width \cdot Height}$
- Circularity
  $\frac{Perimeter}{2\sqrt{(\pi \cdot Area)}}$
- Feret's diameter (Longest distance)
- Orientation of Feret's diameter

2.4 Classification

Trusting specific features more, e.g. weighting them more in an image for classification, we can modify the euclidean distance formula:

$$D = \sqrt{(W_1(x_1 - x_2)^2 + W_2(y_1 - y_2))}$$

This is a very useful option for machie-learning applications. Using classifications, such as shape, center and features thelike, is much more efficent for detecing e.g. humans, since skin-hair etc color is non-vital for this sort of implementation.
Using ratios for feature matching is much better, e.g. $\frac{w}{h}$ instead of w and h seperately. This also goes for normalization (ratio between features). Normalization:

$$x' = \frac{x - x_{min}}{x_{max} - x_{min}}$$

3 Machine-learning - k Nearest Neighbour

The nearest neighbour in the form of a 2d graph, given the different positions of classes with features f1 and f2, a specific class will be defined as a class of the same type as the closest neighbour. K stands for how many neighbours are taken into consideration (consideration will be a value of how many neighbours to compare to, e.g. (two triangles and a circle are neighbours)) Probability of a class is given by:

$$p(C_j|x) = \frac{k_j}{K}$$

So, 2 circles and a triangle neighbour, where $C_j \epsilon (Circle, Triangle), K = 3$
$p(Circle|x) = \frac{2}{3}$ $p(Triangle|x) = \frac{1}{3}$

4 Knowledge

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5 Important notes

6 Exercise