

Object Classification Using Etalons

An etalon is a point that well represents a class of an object. We will compute etalons for each class of objects in our training image. Then we will classify unknown objects by finding the closest etalon. The unknown object is then assigne the class label of the closes etalon. An illustration of such a situation is depicted in Figure 1.

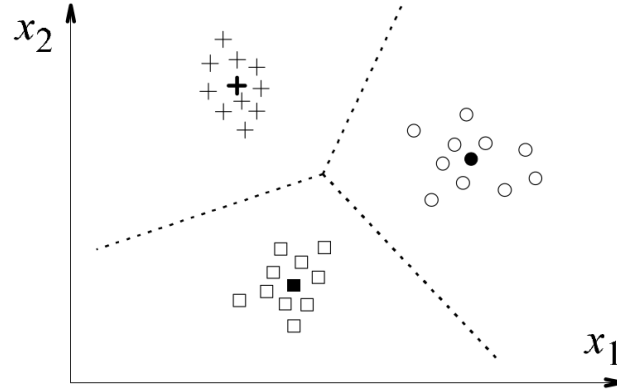


Figure 1: An illustration of features x_1, x_2 and etalons representing each class (etalons are bold for each class). You can think of the dashed line as a Voronoi diagram.

Computing Etalons

Ethalon e_r is a vector that best represents each class ω_r . The easiest way to compute the etalon is by computing the average value

$$\mathbf{e}_r = \frac{1}{N_r} \sum_{i=1}^{N_r} \mathbf{x}_{r,i}, \quad (1)$$

where N_r is number of training feature points of the class ω_r and $\mathbf{x}_{r,i}$ are values of the feature point vector.

In our case the ω_r consists of square, rectangle, and star. Values $\mathbf{x}_{r,i}$ are from vectors F_1 and F_2 .

Let's assume that an unknown object (one that we obtain from our testing image) is represented using feature vector \mathbf{x} . Our classifier that assigns the unknown object a class of which etalon has the shortest distance to the point \mathbf{x}

$$\min_r (\text{dist}(\mathbf{e}_r, \mathbf{x})). \quad (2)$$

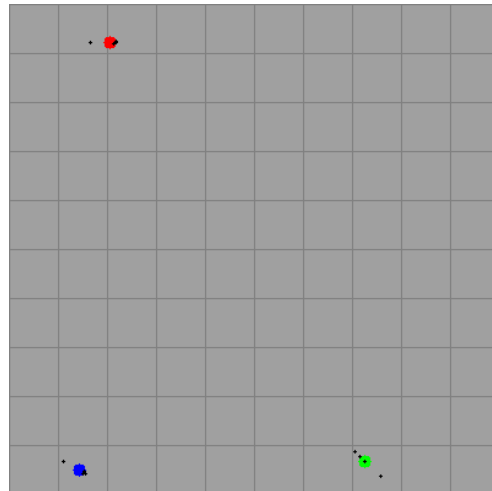


Figure 2: An illustration of features F_1 , F_2 and etalon representing each class (your results may slightly vary).