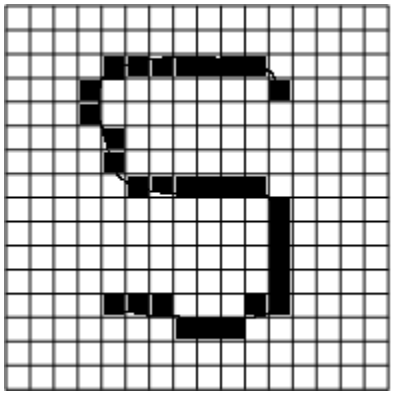
Pattern Recognition Example

Assume a classifier is to be designed to recognize hand-written S and T letters. We assume no other letter is provided as input. Besides we assume that there exist enough labeled samples to design our classifier.

We map the training patterns vertically and horizontally as by counting the black boxes in each row/column as shown in the figure below:



Horizontal mapping result: (0, 0, 7, 2, 1, 1, 1, 6, 1, 1, 1, 1, 5, 3, 0, 0)

Vertical mapping result: (0, 0, 0, 2, 4, 3, 3, 3, 3, 3, 3, 6)

Assuming number the of horizontal or vertical lines as features, where a line is identified with >= 4 pixels, we will have

Horizontal lines (this example) = 3

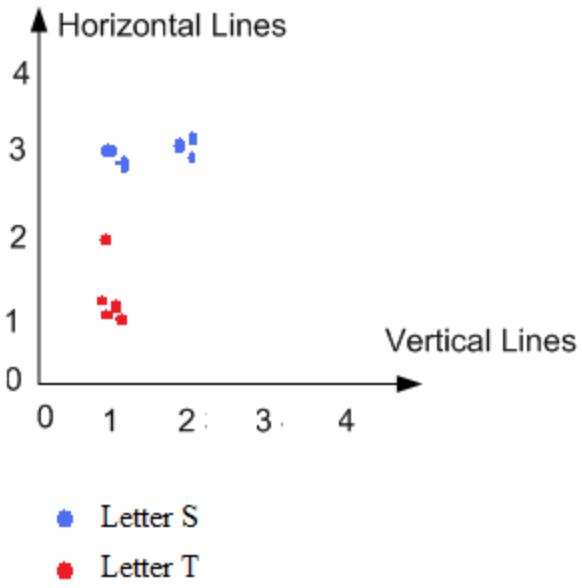
Vertical lines (this example) = 2

Repeating the experiment with a large number of samples we can find the average number of horizontal and vertical lines for each class of letters (S, T). Given the number of horizontal lines and vertical lines in each sample, and assuming that we have computed the average values, co-variances can be obtained

We consider the distributions of the features to be Gaussian. Therefore, mean (average) and covariance values are sufficient to find the a-posteri probabilities.

Assuming prior probabilities to be equal we have P(S) = P(T) = 0.5

Figure below shows a sample distribution of S and T letters in our feature space.


Horizontal Lines
4
3
2
1
0
Vertical Lines
0
1
2
3
4
Letter S
Letter T