In The Name of Almighty

Statistical Pattern Recognition-**HW#4**

Problem 1

A set of samples drawn from an unknown density function is given as: {x = -7, -5, -4, -3, -2, 0, 2, 3, 4, 5, 7}.

Find the Parzen estimation of the density right at each of the above points using $h_n = h_1/\sqrt{11}$ with $h_1 = \sqrt{11}$ and the following window function:

$$\phi(u) = \begin{cases} 1/2 & |u| \le 1 \\ 0 & \text{otherwise} \end{cases}$$

Problem 2

Repeat problem 1 using $h_1 = 2 * \sqrt{11}$

Problem 3

Repeat problem 1 using a triangular window function as:

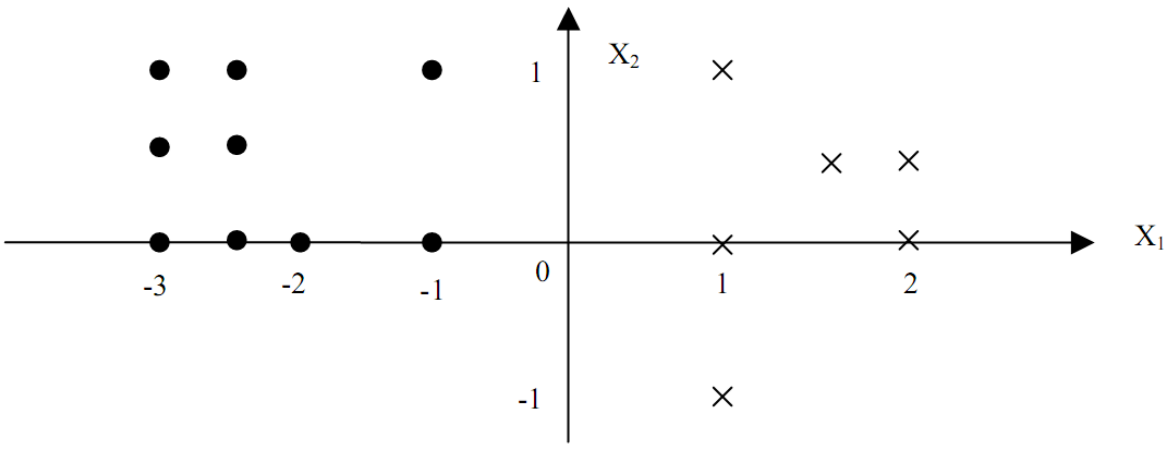
$$\phi(u) = \begin{cases} 1-|u| & |u| \le 1 \\ 0 & \text{otherwise} \end{cases}$$

Problem 4

Do problem 1 using the k_n-nearest-neighbor density estimation method (unbiased version) using $k_n = k_1 * \sqrt{N}$ with $k_1 = 2/\sqrt{N}$

Problem 5

In a two-class problem, the two-dimensional training samples of each class are given as shown in the following figure. Estimate $p(x|\omega_i)$, i = 1,2 at **x** = (0,0) using the k_n-nearest-neighbor method with $k_n = 3$. Use the unbiased estimate and city block distance.



City-block distance: $$L_1 = d(\mathbf{x}_i, \mathbf{x}_j) = \left[\sum_{m=1}^{l} |x_{im} - x_{jm}|\right]$$