ON THE NUMBER OF REFLEXIVE AND SHARED NEAREST NEIGHBOR PAIRS IN ONE-DIMENSIONAL UNIFORM DATA

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Abstract: For a random sample of points in $\mathbb{R}$, we consider the number of pairs whose members are nearest neighbors (NNs) to each other and the number of pairs sharing a common NN. The pairs of the first type are called *reflexive NNs*, whereas the pairs of the latter type are called *shared NNs*. In this article, we consider the case where the random sample of size n is from the uniform distribution on an interval. We denote the number of reflexive NN pairs and the number of shared NN pairs in the sample by R_n and Q_n, respectively. We derive the exact forms of the expected value and the variance for both R_n and Q_n, and derive a recurrence relation for R_n which may also be used to compute the exact probability mass function (pmf) of R_n. Our approach is a novel method for finding the pmf of R_n and agrees with the results in the literature. We also present SLLN and CLT results for both R_n and Q_n as n goes to infinity.

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