

ABSTRACT

We develop a methodology for evaluating probabilities which involve linear combinations of spacings and then present some applications of this methodology. The basic idea underlying our method was given by Huffer (1988): A recursion is used to break up the joint distribution of several linear combinations of spacings into a sum of simpler components. The same recursion is then applied to each of these components and so on. The process is continued until we obtain components which are simple and easily expressed in closed form. We describe algorithms and a computer program (written in C) which implement this approach. Our approach has two advantages. First, it is fairly general and can be used to solve a variety of problems involving linear combinations of spacings. Secondly, because the output of our procedure is a polynomial whose coefficients are computed exactly, we can supply numerical answers which are accurate to any required degree of precision. We apply our program to compute the distribution of the scan statistic for small sample sizes. We also use the recursion and computer program to calculate the lower order moments of the number of clumps in randomly distributed points. We can use these moments to obtain bounds and approximations for the distribution of the scan statistic. Our approximations are based on fitting a compound Poisson distribution to the moments of the number of clumps.