



## The Volume of the Union of Many Spheres and Point Inclusion Problems (Classic Reprint) (Paperback)

By Paul G Spirakis

Forgotten Books, 2018. Paperback. Condition: New. Language: English . Brand New Book \*\*\*\*\* Print on Demand \*\*\*\*\*.Excerpt from The Volume of the Union of Many Spheres and Point Inclusion Problems The problem of estimating the area of the union of many circles in the plane was first posed by [shamos, It is straightforward to solve this problem by an  $O(n^2)$  time deterministic algorithm. We show here how to use Monte Carlo techniques (developed by [karp, Luby, 83] for estimation of the failure probability of an  $n$ -component system) to get an  $O(n)$  probabilistic algorithm. This algorithm can trivially be extended to compute the volume of the union of  $n$  spheres (or boxes, or any collection of  $n$  fixed description objects) in  $k$  dimensions, in time  $O(nk)$ . The accuracy of the algorithm is controlled by the algorithm implementer. Its running time is optimal in the sense that  $O(n)$  time is needed to compute the sum of  $n$  real-numbers, under quite general models of computation. An application of this algorithm is a probabilistic  $O(n)$  time method to test if  $n$  given spheres have a nonzero measure intersection. This can also be extended to test for intersections in  $k$  dimensions. No efficient algorithms for...



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