This is the Klee's measure problem.
1. segment tree. $O(n \log n)$.

higher dimensions: $O((n^{d/2}/\log^{d/2-2} n)(\log\log n)^{O(1)})$, for $d \geq 5$ [1].

$\Omega(n \log n)$ lower bound (under the usual model of computation) [2].

References

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