Analysis of Robin Hood and Other Hashing Algorithms Under the Random Probing Model, With and Without Deletions

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Thirty years ago, the Robin Hood collision resolution strategy was introduced for open addressing hash tables, and a recurrence equation was found for the distribution of its search cost. Although this recurrence could not be solved analytically, it allowed for numerical computations that, remarkably, suggested that the variance of the search cost approached a value of 1.883 when the table was full. Furthermore, by using a non-standard mean-centred search algorithm, this would imply that searches could be performed in expected constant time even in a full table. In spite of the time elapsed since these observations were made, no progress has been made in proving them. In this paper we introduce a technique to work around the intractability of the recurrence equation by solving instead an associated differential equation. While this does not provide an exact solution, it is sufficiently powerful to prove a bound of ?2/3 for the variance, and t