Abstract

In this paper we consider the problem of compactly representing a rewritable array of bit-strings. The operations supported are: create (N, k), which creates a new array of size N, where each entry is of size at most k bits and equal to 0; set (i, v), which sets $A[i]$ to v, provided that v is at most k bits long and get (i) which returns the value of $A[i]$. Our aim is to approach the minimum possible space bound of $S = \sum_{i=0}^{N-1} |A[i]|$, where $|A[i]| \geq 1$ is the length in bits of the number in $A[i]$, while simultaneously supporting operations in $O(1)$ time. We call such a data structure a *Compact Dynamic Rewriteable Array (CDRW)* array. On the word RAM model with word size w, for $n < 2^w$ and $k \leq w$, we give practical solutions based on *compact hashing* that achieve $O(1/\epsilon)$ expected time for get and set and use $(1+\epsilon)S + O(N)$ bits, for any constant $\epsilon > 0$. Experimental evaluation of our (preliminary, only somewhat optimized) implementations shows excellent performance in terms of both space and time, particularly when heuristics are added to our base algorithms.