On the construction of perfect deletion correcting codes

On the Construction of Perfect Deletion Correcting Codes

PATRICK A.H. BOURS
Eindhoven University of Technology, The Netherlands

We consider a way to construct perfect codes capable of correcting 2 or more deletions using design–theory.

We will use an alphabet $A(v) = \{0,1,...,v-1\}$ of size v. Let $A_k(v)$ denote the set of words of length k over the alphabet $A(v)$ and let C_t be a subset of $A_k(v)$ such that every word of length t over $A(v)$ is a subword of exactly one word of C_t. Now C_t is called a perfect $(k-t)$–deletion correcting code over $A(v)$.

Our construction consists of two steps.

First $A_k(v)$ is partitioned into some classes $K_1, K_2,...,K_p$ in such a way that if we choose a word x from class K_i as a codeword, it is easy to see how many words of other classes may not be chosen as codewords. Now the problem is reduced to finding subsets L_i of K_i $(i = 1,2,...,p)$ such that $C_t = L_1 \cup L_2 \cup ... \cup L_p$, and we will derive some relations on the sizes of these sets L_i. From this we can also find upperbounds on the cardinality of insertion/deletion correcting codes.

In the second step we will use design theory for the construction of the elements of the subsets L_i $(i = 1,2,...,p)$.