**Abstract**

Recently the power consumption identified as one of the most pressing challenges of data transmission. Though a considerable reduction of the size of data is obtained from Huffman code and several methods have been proposed to improve the data compression rate. These methods improves only the total number of bits without consideration of transmission cost. In this paper, we propose a new approach to reduce the power consumption, by applying genetic algorithm for minimising the total number of switches, either inter- or intra-switch. The approach starts its operation by generating a set of trees considered as initial population for the genetic algorithm, each one of these trees represents a set of code words (solution), after that the genetic operators such as selection, crossover and mutation will be applied to the initial population in order to increase the quality of the solutions. The amount of power consumption is proportional to the total number of switches on the whole sequence. The performance of the approach is evaluated by applying it to compress some standard biological datasets. The experiments yield that the proposed approach improves the power consumption rate considerably comparing with classic Huffman code.