Abstract

Since the pioneering work of the sixties, a number of techniques have been developed to verify or prove correctness of algorithms. One such techniques, preferentially applicable to construct invariants or to verify the termination of loops in numerical algorithms, relies on finding a ranking function. This function must be non-negative and must decrease at each iteration of the loop. We show that for a large class of numerical programs, finding such a ranking function is equivalent to finding a point in a semi-algebraic set. Then we show how one can efficiently find such a point using a semidefinite relaxation and we provide some encouraging experimental results.