There are a set of keys, K = {k1, k2, …, kx} and a set of locks, L = {l1, l2, …, ly} where x,y > 0. For every pair (km,ln), we define r(m,n) as a relationship between key km and lock ln such that r(m,n) = 1 if km opens lock ln and r(m,n) = 0, otherwise. Initially, the relationship r(m,n) is stored in the (m,n)th element of mateix M.

Given a set of keys K, a set of locks L, and their relationship stored in a matrix M, GA considers the number of locks in L that can be opened by each key in K (in other words, the total number of “1”s appearing in each row of M) in order to make a series of decisions regarding the local optimum.The output of GA is O which contains all keys selected in the search process.