This algorithm is mainly divided into three parts, the main body of the algorithm is the combination of QD algorithm and DE algorithm.

1. We will evenly divide the solution area into several subregions, with the specific sizes being 2.5 intervals for the first variable and 200 intervals for the second variable. At the same time, we initialize a "regionbest" array to record the current optimal target value in each sub block. The initial value of each element in the "regionbest" array is infinite The 'regionbestpos' array is used to record the position of each sub block with the optimal target value. It is evaluated several times (1157 times) to ensure that both the regionbest array and the regionbestpos array have valid values.

2. Then enter the QE stage. We select the optimal vector from a sub block in the northeast, southeast, northwest, and southwest directions of the solution area as the collaborative vector to participate in perturbing the optimal vector. If a better vector is generated, we need to update the global optimal vector in a timely manner, including the values of the "regionbest" and "regionbestpos" arrays.

3. When the number of evaluations reaches a certain threshold, we consider that we have found the approximate location of the optimal solution and require a more precise search. We give a search angle and a smaller search radius to explore whether the optimal vector will improve at that angle and search radius. If there are better results, we record the current angle and continue the next search along that angle. If not, we change the angle and continue the search until the evaluation reaches 5000 times.