We visualized the mutation strategy of BOptformer to explore its behavior. We use polynomial mutation, which is commonly used in evolutionary algorithms, as a reference. Given the input population (input), the mutated population (OB1) is obtained through OB1; the new population (mutpolyn) is obtained by performing polynomial mutation on the input population. We visualized F4-F9. The results are displayed as follows:

We can observe the following phenomena:
1. The population generated by performing polynomial mutation is more evenly distributed on the landscape. However, most of the solutions produced by BOptformer's mutation strategy are concentrated in "areas with greater potential", which are closer to the optimal solution. Moreover, the population distribution generated by our scheme also takes diversity into account. In the non-optimal solution area, it is also more comprehensive than that of polynomial mutation, which is more conducive to jumping out of the local solution.
2. The population produced by performing polynomial mutation moves slightly compared to the original population. However, the mutation strategy of BOptformer can guide the input population to make big moves toward the optimal solution, which significantly accelerates the convergence of the algorithm.

This shows that BOptformer is able to use the information of the objective function to guide the design of the mutation strategy, making it more applicable to the target optimization task, which is consistent with our motivation.

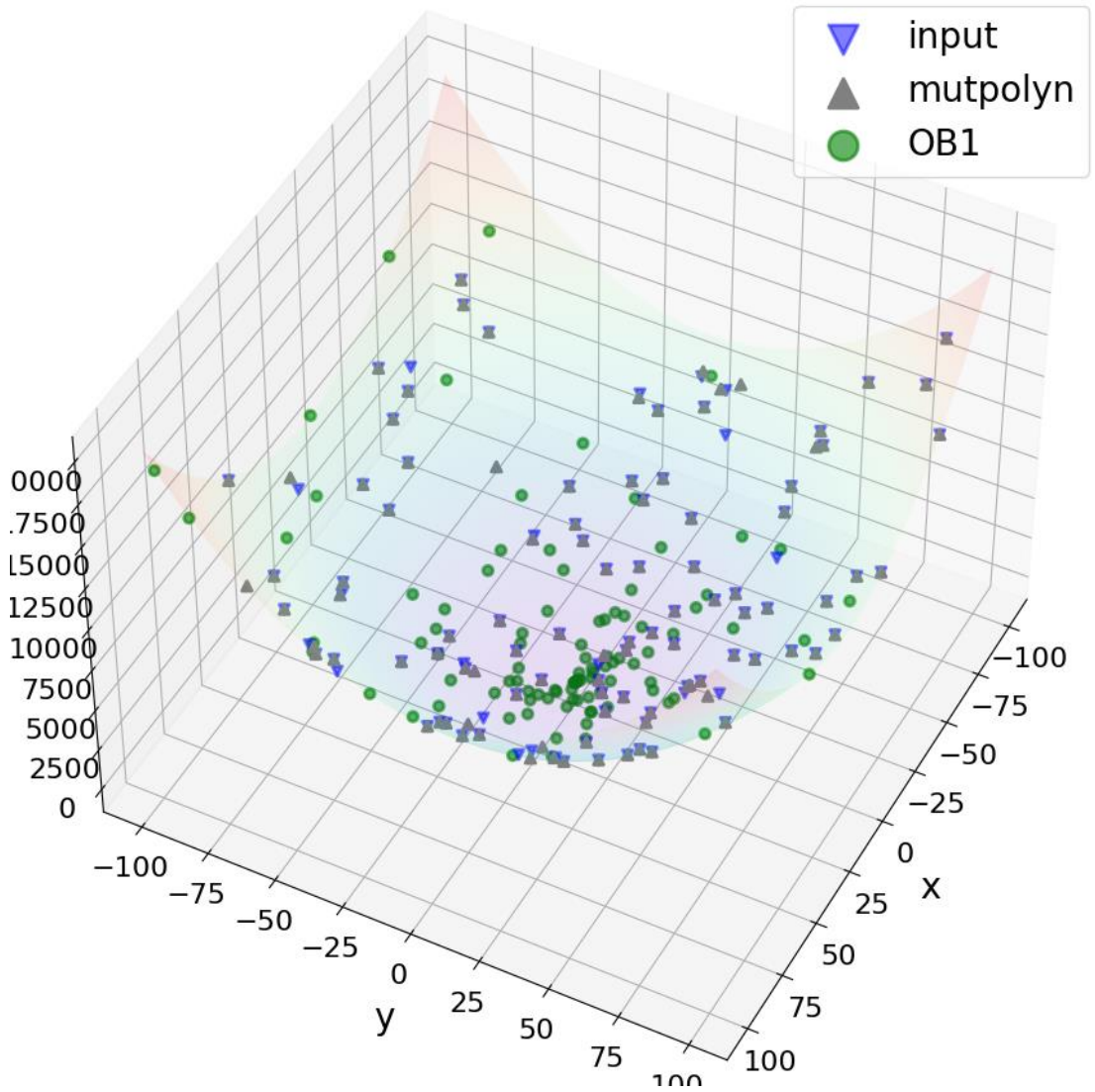

Figure 1 F4 function (d=2).

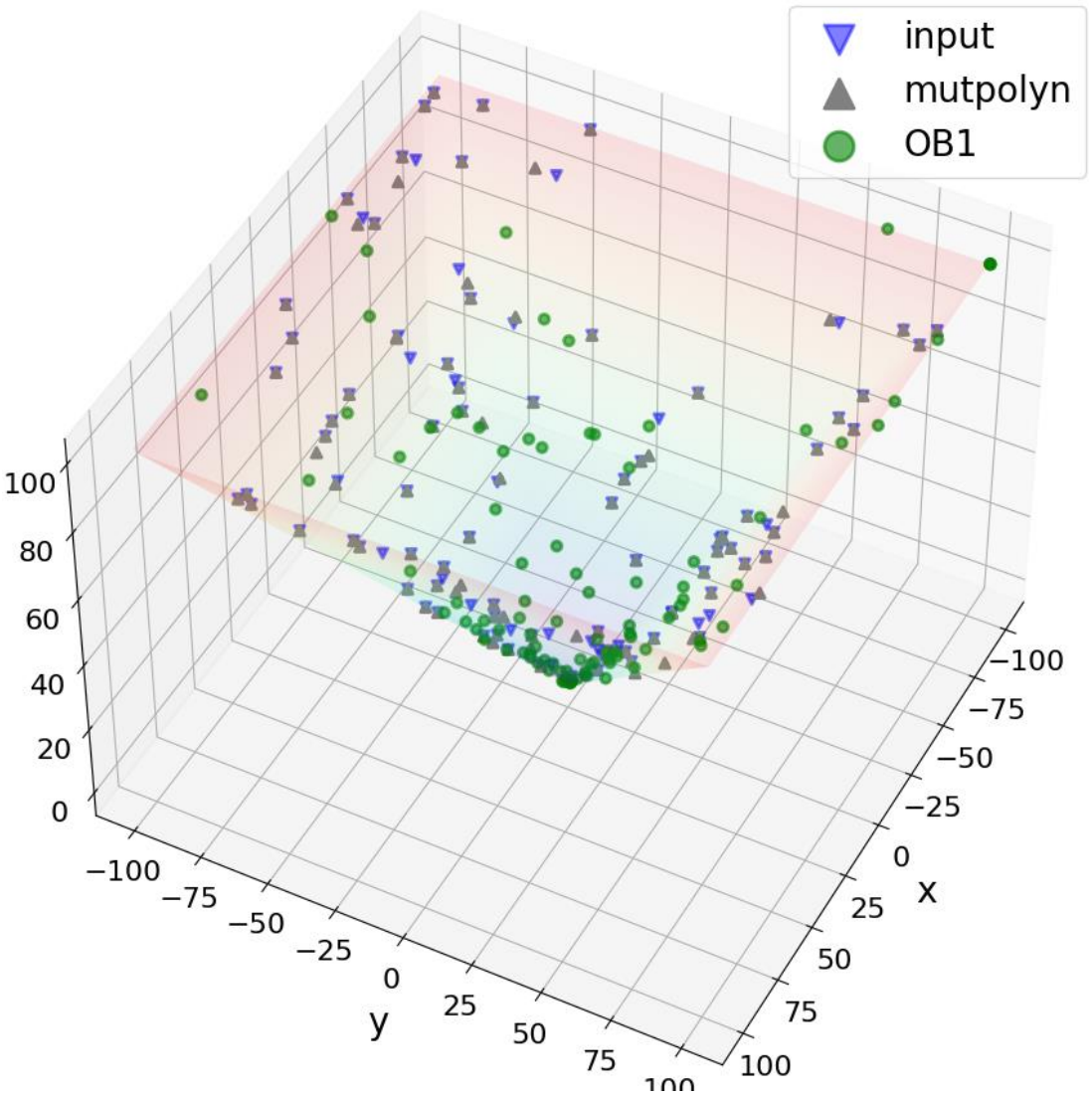

Figure 2 F5 function (d=2).

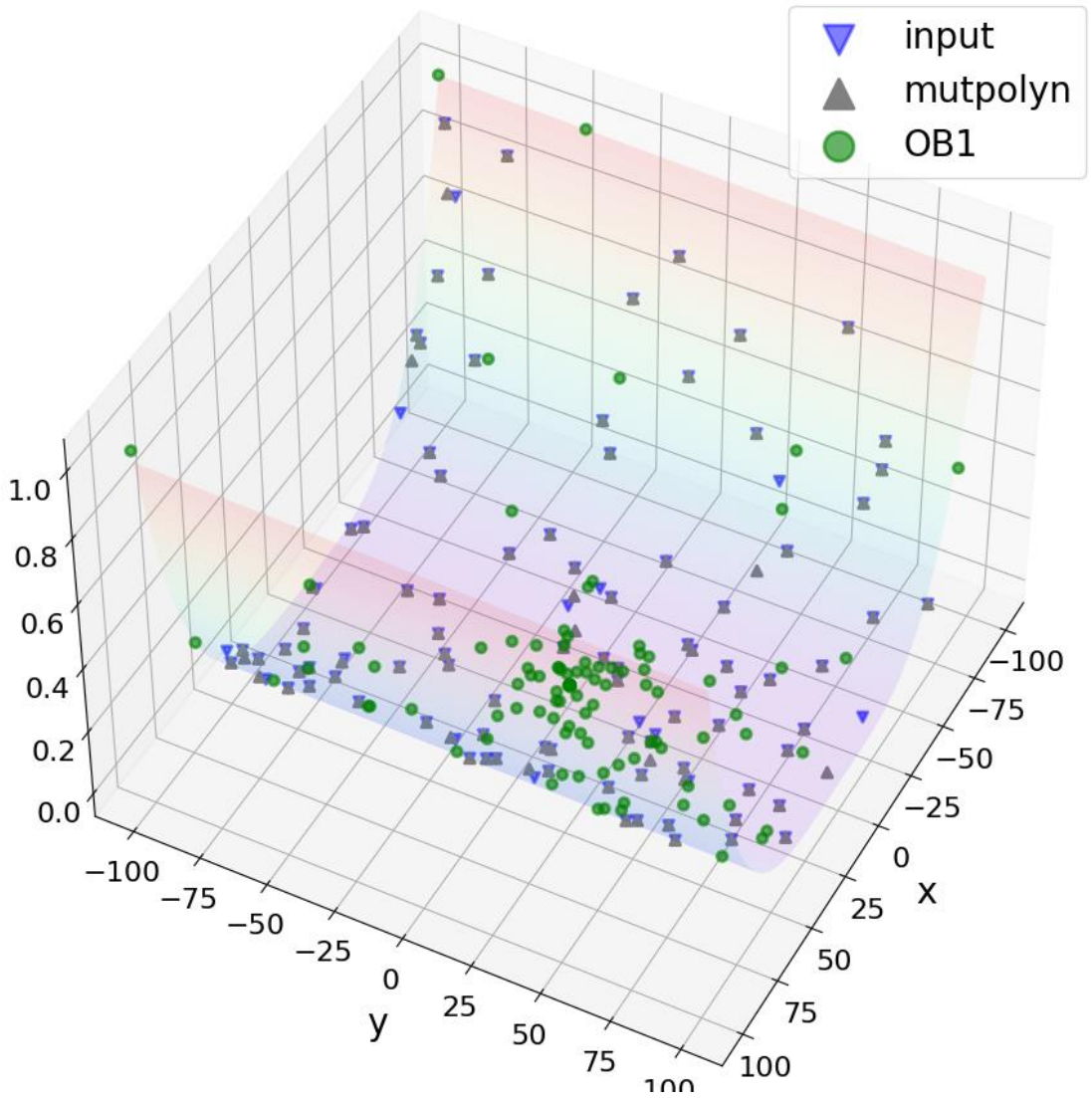

Figure 3 F6 function (d=2).

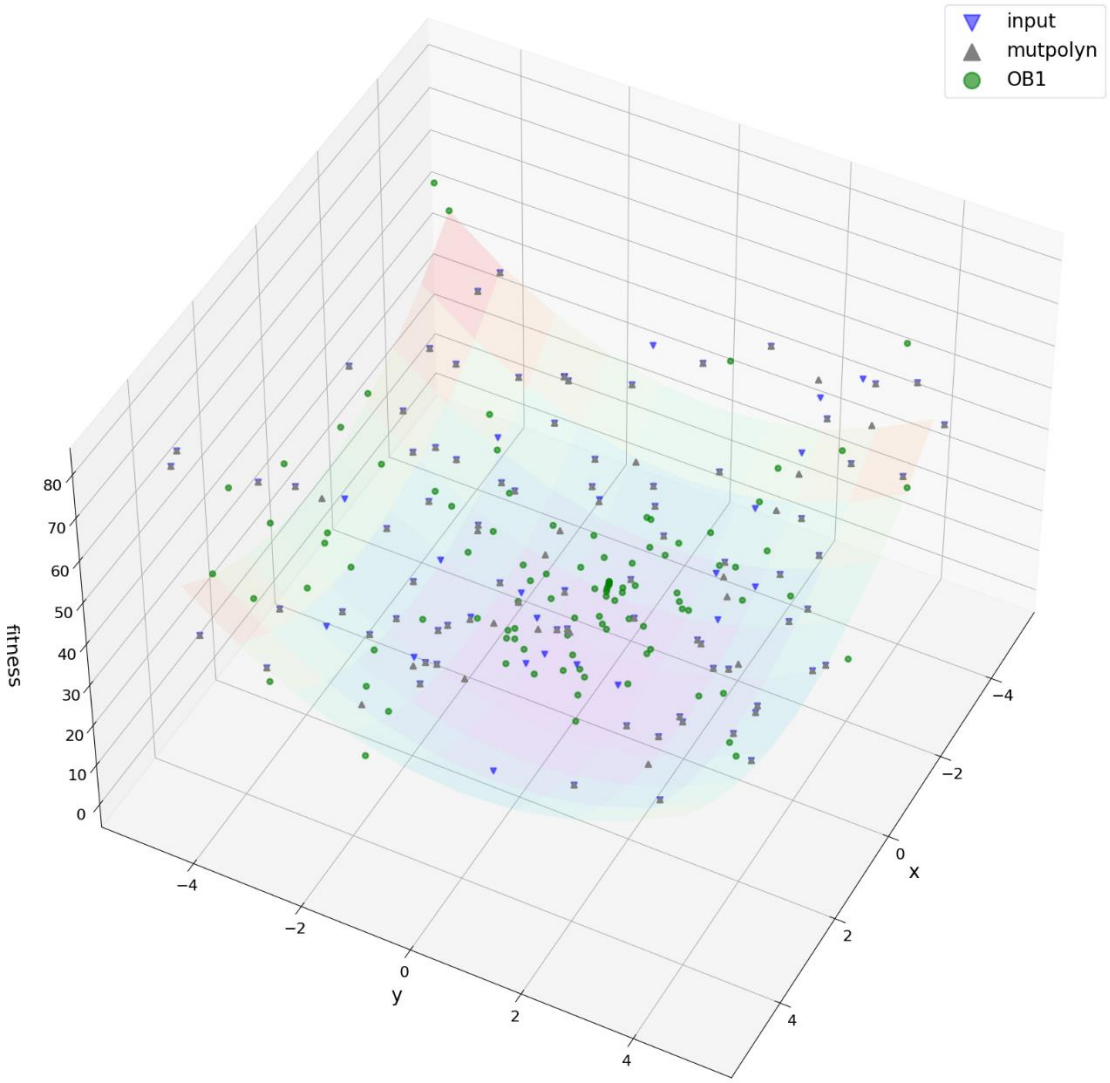

Figure 4 F7 function (d=2).

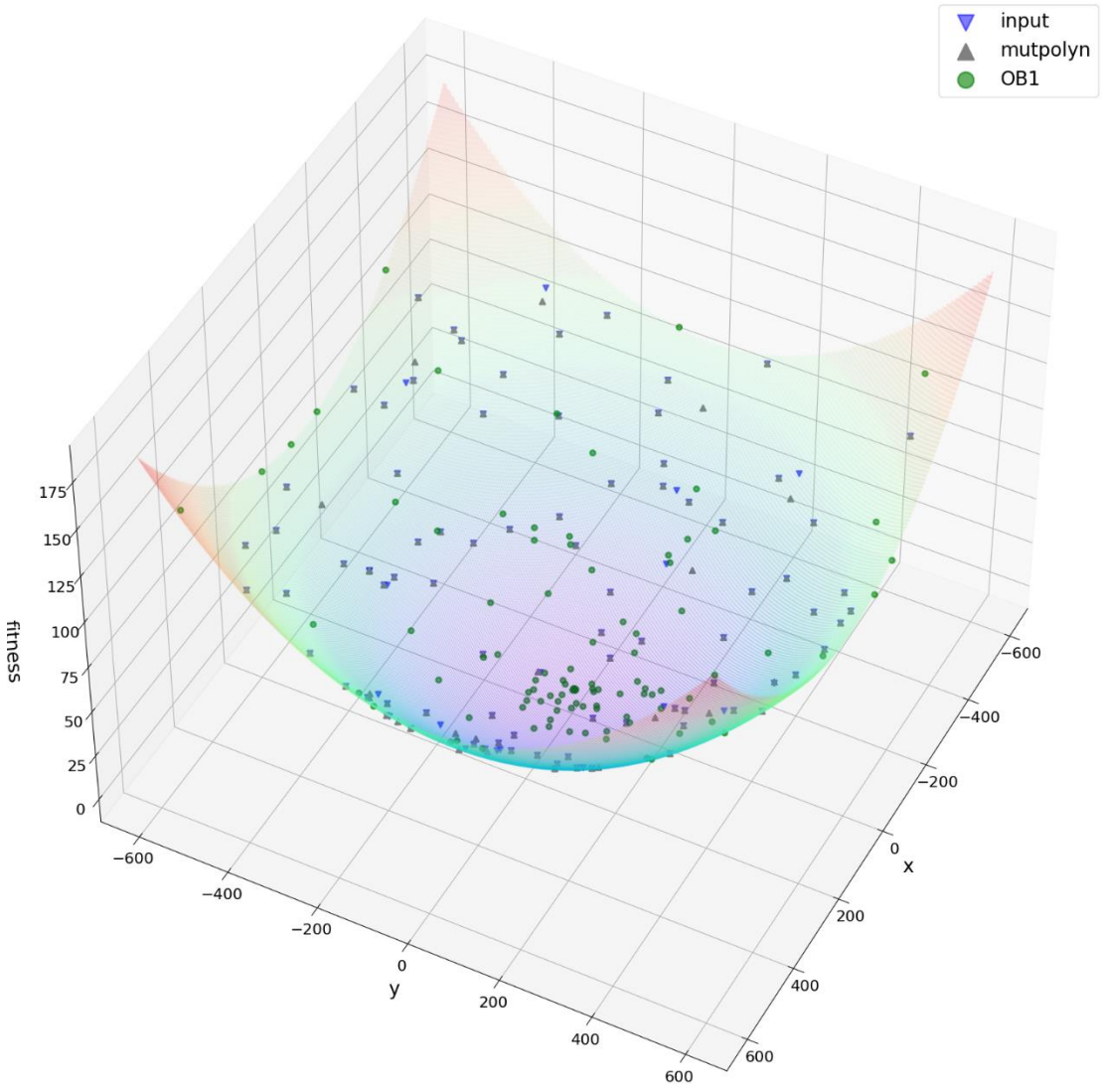

Figure 5 F8 function (d=2).

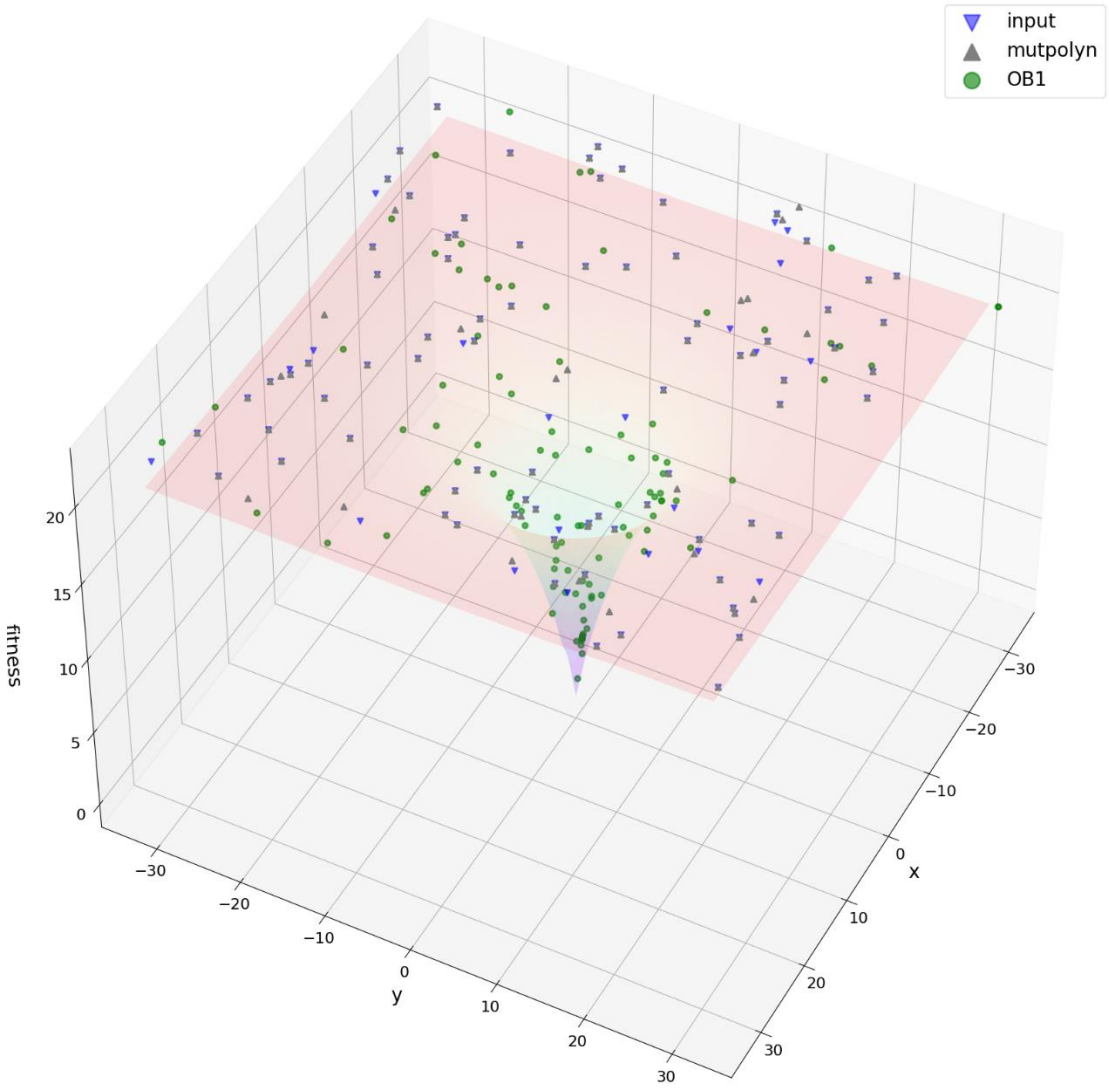

Figure 6 F9 function (d=2).