Advanced Artificial Intelligence: Final Project

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Analysis of the comparison algorithms

Introduction

In the elite model, a certain number of chromosomes with the best fitness from the previous generation are preserved for the next generation. The remaining chromosomes are crossed and the resulting individuals are preserved for the next generation. The newly generated individuals are mutated, if the random number is smaller than the mutation rate.

Cross Over

Two chromosomes were randomly selected as paternal and crossed. Randomly select the start and end points for the selected parent routes. One parent provides routes for the selected range, and the other parent provides non-repeating routes for the rest of the range. Then divide m routes according to the original routes length.

Mutation

Choose any two routes and randomly choose their starting and ending points to swap. After the swap, update the length of each route.

Strengths and Weaknesses

Advantages:
Earlier crossover can make the path length converge quickly, and each generation has enough new individuals
Disadavantages:
When the algorithm runs to a certain extent, it still crosses repeatedly, and the similarity between the parent generation and the child generation is low and the change is too large, so it is difficult to find the optimal solution.

Solution

Result

Results contrast

Instance	Baseline	Comparsion
mtsp51	853.376	584.565
mtsp100	77686.157	58303.962
mtsp150	125284.167	106089.219
pr76	332571.458	234267.283
pr152	517483.903	356429.964
pr226	850460.009	682017.378

Discussion

Conclusion

Algorithm GA.

Input:

Mutation Rate: rmp

The number Trucks: m

Output: The distance of the Global routes, $Global\_Distance$;

Initialize the population of the individuals and generate the routes and calculate the distance

if $Elitism$ **then**

save n routes which has the best fitness or the smallest distance.

set $elitism\_num = n$

end if

while $elitism\_num \neq Population\_size$ **do**

cross over and generate the child and save the child in the generation.

end while

if $rand > rmp$ **then**

randomly choose two routes in the individual and mix up and update the length of the new route

save the mutation

else

save the original individual

end if

Got the new generation.The new generation size is twice as much as the original size.

rank the fitness and choose the top original population size individuals in order

return $newgeneration$;