Free Challenge Description: Use State Clustering to Accelerate The Search Process

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Motivation :
WrightEagle2D use search method to make decision. In recent years, we developed a set of techniques which extended the search depth and accelerate the search process.
A large number of states are similar and we can only extend the best one of the states in the search process.
1: Successor states are similar.
2: Rewards or Heuristic Rewards are similar.
Based on the observation, we can cluster the states and extend only the representative in each cluster.

We use 2 cluster methods, K-means and Hierarchical Clustering. And we choose the highest evaluation state as the representative.

Experimental results show that the effect of the two clustering algorithms are similar.
Limit the search depth to 5 macro actions. Max time consumption(the worst case in a set of random scenes):
original search method: 12280.7ms
with cluster: 283.6ms
Evaluation compared to original search method:
The evaluations of 67% scenes have no change($E=E'$)
The evaluations of 97.7% scenes decrease by less than 25\%.($E > 0.75E'$)