

Learning Search Space Partition for Black Box Optimization using Monte Carlo Tree Search

Motivation

Task: Neural Architecture Search Method: MCTS using the action space of *Global* and *Sequential*







Sequential

Research Question Can we learn the action space for **MCTS to partition the search space?**

Learning Space Partition



Latent Action:

- K-means on [x, f(x)] to find two clusters.
- Use SVM to learn a boundary.

Linnan Wang

Latent Action Monte Carlo Tree Search

1. Learning and Splitting



- Dynamically create the tree per iteration.
- Redirect samples to tree leaves.

2. Select



 Dynamic exploration and exploitation trade-off by recursively selecting via UCB.

3. Sampling

optimization from selected partition



etc.

Review of Search Space Partition

K-ary partition



Voronoi partition





Rodrigo Fonseca Yuandong Tian







min f(x), $x \in \Omega_E$ **Bayesian Optimization** Evolutionary Algorithm







3. MuJoCo Tasks







Experiment Results