anytime tree searches for operations research
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How to solve hard problems?

Constructive
local improvement

Tree search principles

initial state
one decision
new state

Each problem can be represented by a search tree. We design generic algorithms that explore this tree.

Applications

Saint-Gobain’s Glass cutting challenge

pack glass items (in blue), minimize the waste (gray) avoid defects (red dots) and many other constraints
We obtained the best final results during the competition

Triangle Width

from embedded vision systems maximize "white triangle" tree search algorithms obtain the best results

Brains on chips

partnership with Netri aims to design devices that mimic brains goal: better studies on Alzheimer’s disease we work on using tree search to generate chips

Research Themes

Integration of AI techniques
Many algorithms exist in AI
They are not well known in OR
We develop a framework in C++ to use them in OR

Offline & Online Learning
use machine learning to obtain better guides
use machine learning to perform heuristic cuts
Use bandit inspired algorithms

Combination with other OR techniques
integrate dynamic programming (history cuts)
integrate pheromones mechanisms from Ant Colony Optimization combine with local search techniques (local search, path relinking etc.)

Use it on other industrial problems
anytime tree search algorithms seem to be suited to solve complex problems we obtained excellent results on such problems compared to other approaches