Taxonomy of Algorithm Theories

Problem Theory
(D → R|O)
generate-and-test
sieves

Global Structure
(R = set + recursive partition)
global search
backtrack
branch-and-bound
Monte-Carlo tree search
binary search

Greedoid structure
greedy

Local Structure
(R = set + relation)
genetic algorithms

Local Structure
(R = set + binary relation)
local search
gradient search (hillclimbing)
MCMC / simulated annealing

Local Poset Structure
(R = set + partial order)

Monotone
Deflationary Function
fixed point iteration

Local Semilattice Structure
(R = semilattice)

Definite Constraint CSP
(O = Horn-like constraints)
constraint propagation

Algebraic Structure
(R = set + constructors)

Divide-and-Conquer
divide-and-conquer

Problem Reduction
Generators
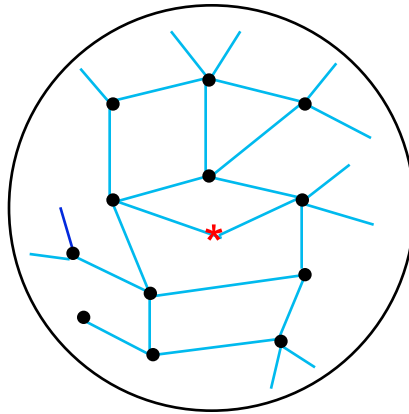*dynamic programming*
AND/OR branch-and-bound
game tree search

Kestrel Institute

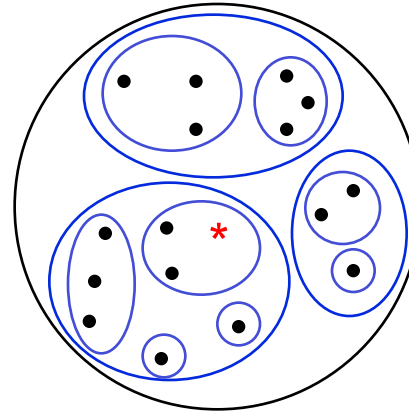Solution space

Feasible solutions
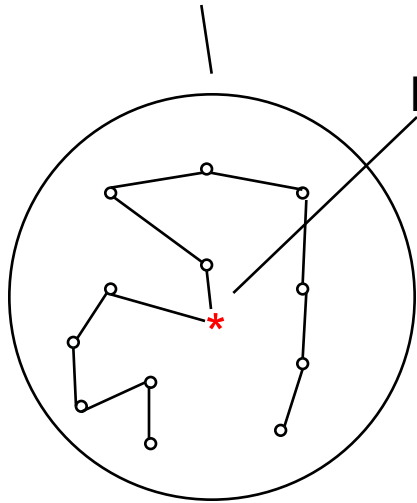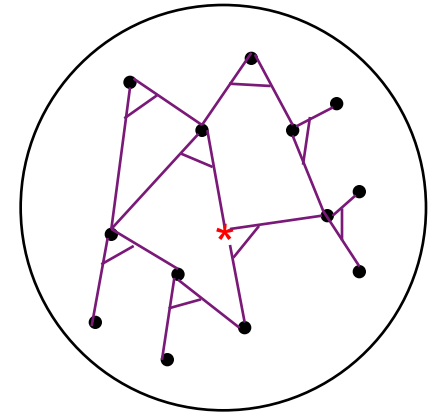
Problem Solving Structure

Computable
Structure
=
solution space
+
generator

Local structure
=
solution space
+
binary relation

Global structure
=
solution space
+
recursive partition

Algebraic structure
=
solution space
+
constructors

Kestrel Institute