Rainbow ACO:
Novel Ant Colony Optimization
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Constant α and β + Dynamic α and β =

Comfort zone
Attraction force
Repulsion force

Fig 2 — Grasshopper optimization

Alpha and Beta values over iterations
Alpha
Beta

Fig 3

Fig 4 — Lin Kernighan

More red -- more pheromone on edge
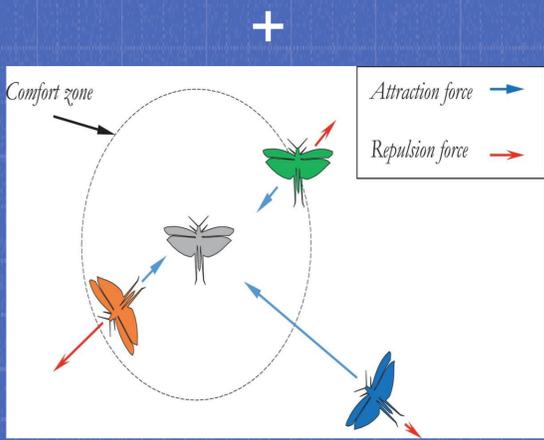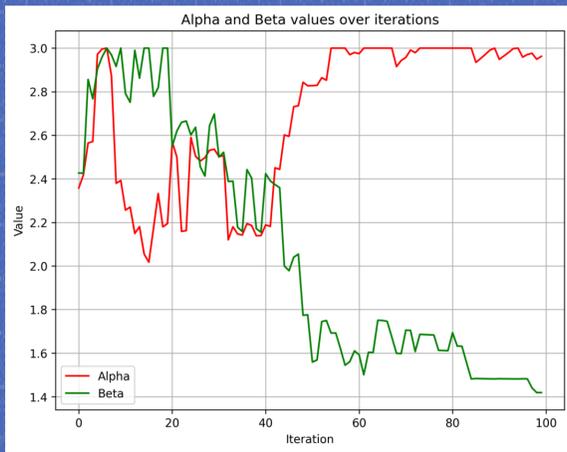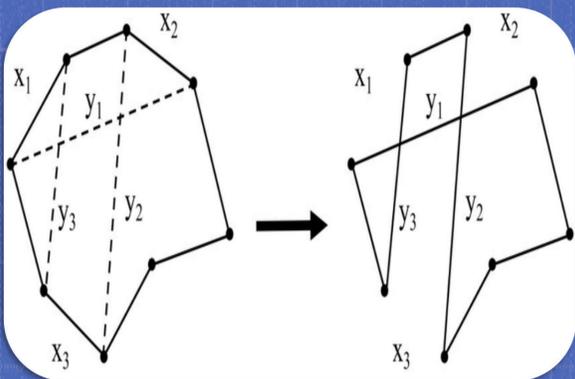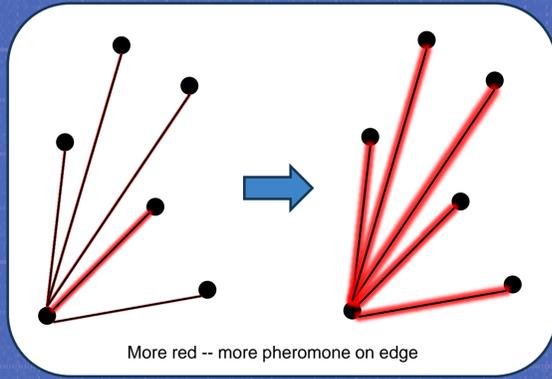
Fig 5 — Stagnation protection

Restriction matrix
Grasshopper Optimization
MMAS constraints
Lambda branching
Convey and Convex 2Opt
Lin Kernighan heuristic

RAINBOW

Fig 1

$\lambda = +\infty$
$\lambda = 2$
$\lambda = 1$

Local optima
Steep hill
Global optima
Valley bottom

Fig 6 — Convey And Convex =

Local best length after each modification
LKH
ACO
CCTwoOpt
Length
Iteration
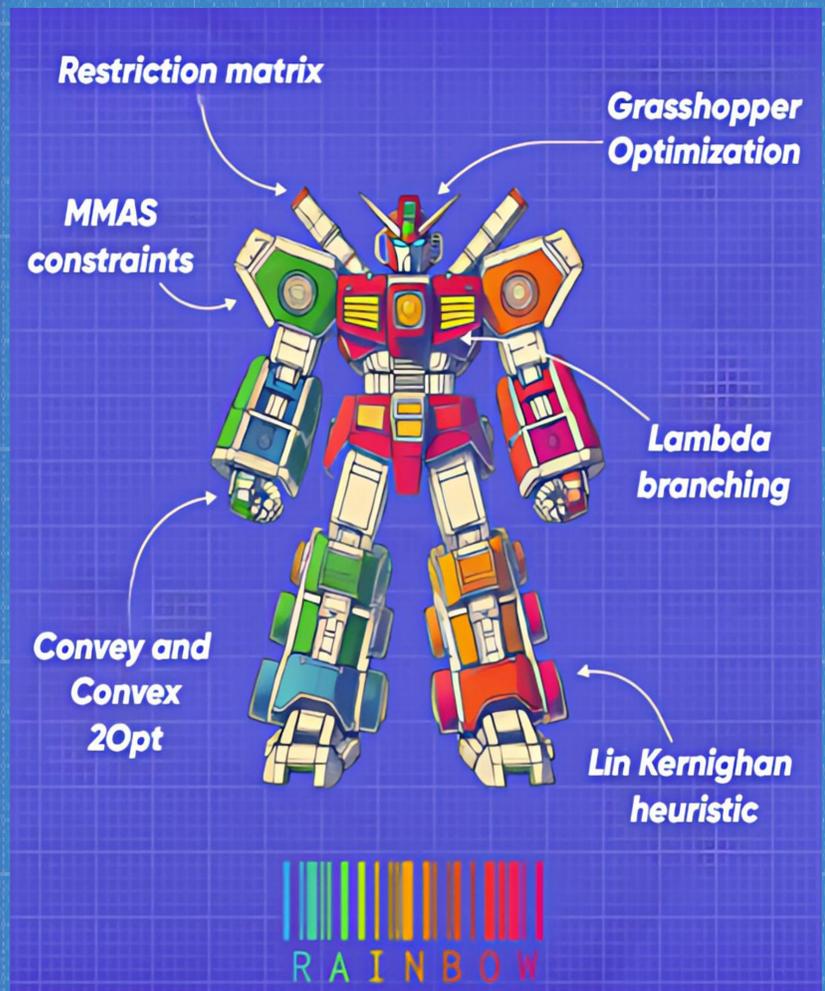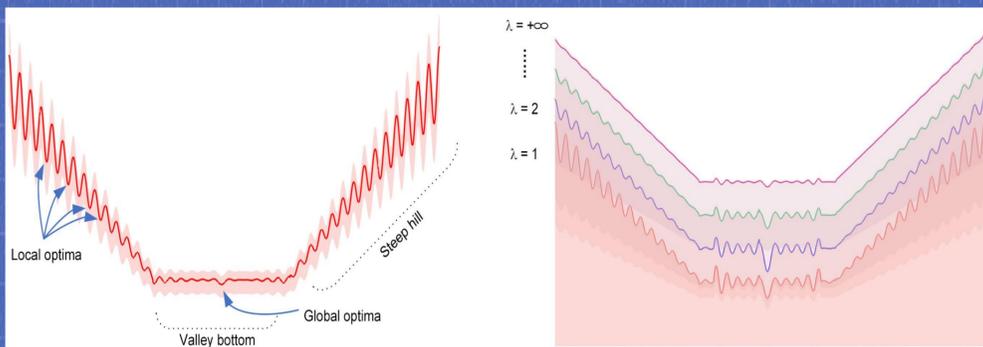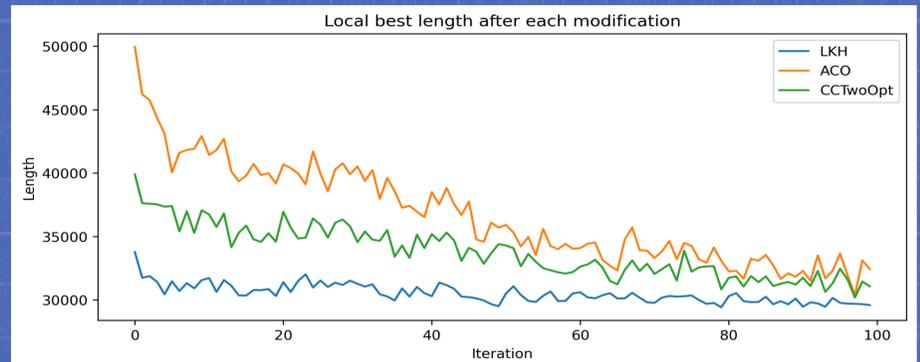
Fig 7

% from each shortest known path

	monalisa100k	vangogh120k	venus140k	pareja160k	courbert180k	earning200k
PartialACO	5.40%	5.90%	6%			7.40%
P-ACO	13.80%	14%	14.30%			16.40%
RestrcitedACO	1.80%	1.80%	1.90%	2%	2.10%	2.20%
RainbowACO	1.60%	1.80%	1.80%	1.90%	1.70%	3.60%
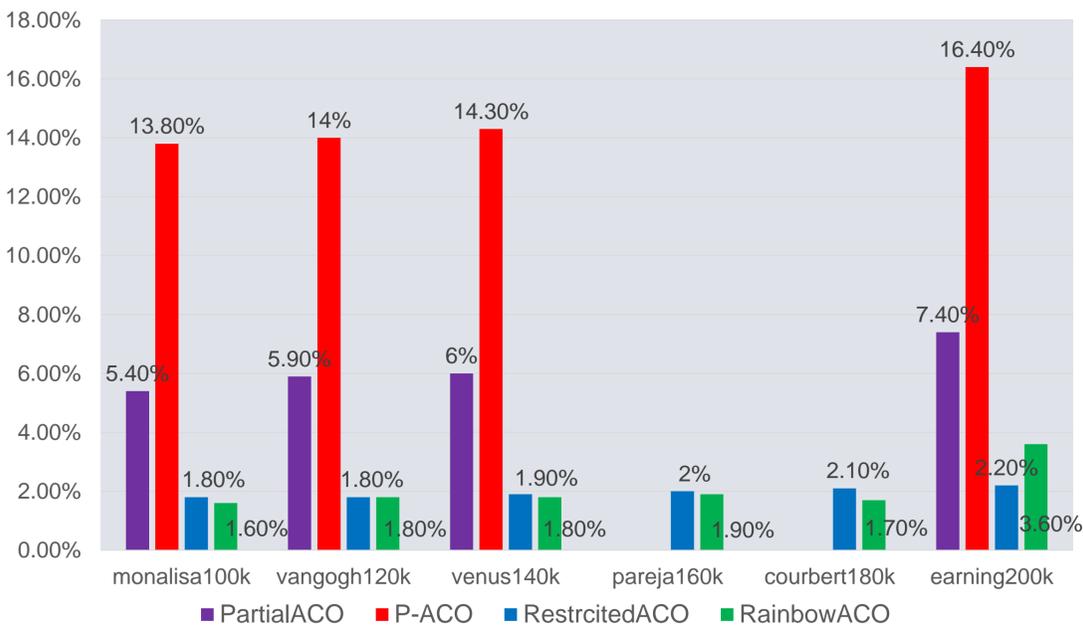
Figure 8

Execution time

	monalisa	vangogh	venus	pareja	courbert	earning
PartialACO	64 min	87 min	125 min	no data	no data	323 min
RestrcitedACO	84 min	114 min	156 min	270 min	270 min	360 min
RainbowACO	106 min	134 min	166 min	200 min	212 min	233 min

Figure 9

Figure 10