Advanced Algorithm: Ant Colony Algorithms and Applications

Assignment Topics HK242

A list of applications of the ACO can be referred at: https://github.com/KMORaza/Py-ACO

Below are some typical case studies for your choice, but not limited.

Scheduling Problem

(1) Job -Shop Scheduling
- o **References:** https://arxiv.org/pdf/1309.5110, https://github.com/addejans/ACO-JSSP

(2) Single Machine Total Weighted Tardiness Problem
- o **References:** https://sci-hub.se/https://link.springer.com/chapter/10.1007/3-540-45356-3_60, https://github.com/lucaoh21/Single-Machine-Total-Tardiness

(3) Resource Constraint Project Scheduling Problem
- o **References:** https://ul.qucosa.de/api/qucosa%3A32033/attachment/ATT-0/ and https://github.com/KMORaza/Py-ACO

Vehicle Routing

(4) Multi-depot Vehicle Routing Problem
- o **References:** https://sci-hub.se/https://www.sciencedirect.com/science/article/abs/pii/S0959652619308790

(5) Vehicle Routing Problem with Delivery and Pick-up
- o **References**: https://research.sabanciuniv.edu/id/eprint/13212/1/optimization.pdf and https://github.com/afurculita/VehicleRoutingProblem, https://github.com/nimagarshasebi/A-hybrid-ant-colony-algorithm

Assignment

(6) Quadratic Assignment Problem
- o **References:** https://sites.cs.ucsb.edu/~gilbert/cs290iSpr2003/presentations/qap.pdf and https://github.com/MLopez-Ibanez/ACOTSPQAP

<u>Evaluation</u>

- - Student teams will submit all materials of the assignment to LMS.
- - Full report will also be examined.

<u>Reports and presentation</u>

- - ***Starting week: 16 (Learning week: 15)***
- - Reports
  - o A full (text) report should include:

- Introduction (*Problem statement, Applications, How the problem has been solving together with their pros and cons, why we use this our method.*)
- Methods/Approaches (*Overview description, architecture/method pipeline, main steps.*)
- Experiments (*Implementation description, testing for benchmark datasets, experimental results, evaluation*)
- Improvement or application proposal (***Optional and bonus.***)
- References.
  o Presentation slides.
  o Source codes.
- Report submission: Team leader should upload to LMS.
- Deadline for report submission: The date of final exam.