

Integer linear programming for routing in delay-tolerant networks

Delay-tolerant networks

Routing in delay-tolerant networks (DTNs) presents unique challenges due to intermittent connectivity, long or variable delays, and the absence of a guaranteed end-to-end path between source and destination at any given time. Unlike traditional networks, DTNs must employ store-and-forward mechanisms, where data is temporarily stored at intermediate nodes until a suitable forwarding opportunity arises. This paradigm requires specialized routing algorithms that can efficiently handle disruptions, maximize delivery probability, and optimize resource usage under uncertainty. As DTNs are increasingly used in applications such as space communications, remote sensing, and disaster recovery, robust and adaptive routing strategies are essential for reliable data transmission.

Objective of the project

The main objective of this project is to implement and compare different integer-programming formulations for the routing problem in DTNs. Constraint programming may also be considered. The resulting formulations and algorithms will be compared to the algorithms proposed in the library <https://github.com/DTN-MTP>

Required skills

Mathematical programming, coding. While the developments shall be made in julia, this language is similar to python and easy to learn, so previous experience is not necessary.

PhD

The internship is funded by an ANR grant and may lead to a PhD addressing more complex modelling questions arising in DTNs, in particular, concerning regional clustering.

Contact

The project will take place at LIRMM in Montpellier, supervised Olivier De Jonckère and by Michaël Poss. Interested students should send an e-mail including their CV and recent marks to:

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