Internship Position: Mixing OR and AI for efficient path computation

The Network and Traffic Optimization research team of the Mathematical and Algorithmic Sciences Lab, Huawei Paris Research Center, located in the Paris area, is looking for internship candidates. The goal will be the design and the implementation of a set of path algorithms issued from traditional OR (Operational Research)-based approaches and empowered by AI (Artificial Intelligence) techniques.

Major Responsibilities

In recent years, the control paradigm of Software Defined Networking (SDN) has affirmed for controlling networks, whose size is getting larger and larger. For instance, SDN can be used to control Data Center Networks (DCN) networks, whose size can scale up to 30k devices. For such a reason, traditional methods for solving the planning and the online path computation problems are no longer enough. It is necessary to empower existing methods to speed up and guide the path computation elements in order to quickly converge to a good and feasible solution without wasting time exploring "useless" parts of the graph.

Current OR-based techniques proved, in the last decades, that they can achieve good performance results, on well-known problems such as constrained shortest path and multi-commodity flow, even for large networks. In parallel, the emerging of AI techniques helped to efficiently solve typical network problems such as traffic load balancing and prediction, acting as support of OR-methods.

In this internship, the goal will be to integrate AI methods into path computation algorithms, in order to accelerate and/or improve the quality of the solution. Some recent works (for instance, Dai et al, "Learning Combinatorial Optimization Algorithms over Graphs", NIPS 2017) showed the potential gain that can be achieved by integrating AI into traditional OR methods.

The main objectives of the internship are the following:

- Design a preliminary algorithm based on AI for solving the constrained shortest path problem
- Improve previous results by testing several AI methods
- Extend the AI-based approach to other path computation methods (i.e., SRLG disjoint paths)

Duration: 6 months
Location: Boulogne-Billancourt, Paris Area
Required Level: Msc in Computer science / Applied mathematics

Technical Skills Requirements:

Candidates must be highly motivated and have the following skills:

- Good knowledge of AI and OR methods
- Good programming and scripting skills (C/C++/Java, Python)
- Knowledge of networking elements (SDN, routers/switches)

Please send your applications to Dr. Paolo MEDAGLIANI (paolo.medagliani@huawei.com). **Successful applicants will be contacted within one month.**

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The Huawei Paris Research Center (PRC) in Paris is responsible for advanced research in the fields of Algorithm and Software design, Aesthetics, MBB & Home device and Parallel Computing, to create and design the innovative technologies and software platforms for our Brand.