Cross-data analysis for a better network monitoring and troubleshooting

Contract type: Public service fixed-term contract
Level of qualifications required: PhD or equivalent
Fonction: Post-Doctoral Research Visit

About the research centre or Inria department

The Inria Sophia Antipolis - Méditerranée center counts 37 research teams and 9 support departments. The center’s staff (about 600 people including 400 Inria employees) is composed of scientists of different nationalities (250 foreigners of 50 nationalities), engineers, technicians and administrators. 1/3 of the staff are civil servants, the others are contractual. The majority of the research teams at the center are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Six teams are based in Montpellier and a team is hosted by the computer science department of the University of Bologna in Italy. The Center is a member of the University and Institution Community (ComUE) "Université Côte d'Azur (UCA)".

Context

As part of the BetterNet Inria Project Lab (IPL) (http://project.inria.fr/betternet/), we are building a scientific and technical collaborative observatory to measure and improve the Internet service access as perceived by users. We propose new original user-centered measurement methods, which will associate social sciences to better understand Internet usage and the quality of services and networks. Our observatory can be defined as a vantage point, where (1) tools, models and algorithms/heuristics will be provided to collect data, (2) acquired data will be analyzed, and shared appropriately with scientists, stakeholders and civil society, and (3) new value-added services will be proposed to end-users.

This postdoc is within the BetterNet Inria Project Lab. It is a joint position between the DIANA team at Inria Sophia Antipolis (south of east of France) and the MiMove team at Inria Paris (near the gare de Lyon). The candidate can be located either in Sophia Antipolis or Paris.

The IPL is developing and federating a number of measurement tools, each relies on a different measurement methodology (for example, active path measurements for ACQUA and passive observations of user’s traffic for HostView). The vantage points for taking measurements are also diverse (mobile devices, desktops, home gateways). Some of these tools gather user feedback on ongoing experience, which is crucial for understanding the user quality of experience, but also challenging to conciliate across tools. The deployment of these tools is underway, which will give us large-scale datasets to infer a number of interesting properties about the edge of the Internet as well as its usage. The analysis of such large-scale datasets also represents a number of challenges. First, Internet measurements are noisy as results can vary significantly even within small time intervals. Second, different tools use different measurement methods, which yield different results. Finally, given the scale of the Internet we cannot expect our deployments to cover all possible paths, so we will be dealing with sparse datasets.

The two contact persons for this position are Renata.Teixeira@inria.fr and Chadi.Barakat@inria.fr

Assignment

The goal of this post-doctoral grant is to conduct research on the correlated analysis of the IPL BetterNet datasets. This analysis will serve multiple purposes:

1. Develop methods to conduct the correlated analysis of this dataset. We must study whether to first calibrate individual datasets to then put them together

General Information

- Theme/Domain: Networks and Telecommunications
- Town/city: Sophia Antipolis
- Inria Center: CRI Sophia Antipolis - Méditerranée
- Starting date: 2018-10-01
- Duration of contract: 1 year, 4 months
- Deadline to apply: 2018-05-20

Contacts

- Inria Team: DIANA
- Recruiter: Barakat Chadi / chadi.barakat@inria.fr

The keys to success

We are looking for candidates with a strong background in Internet measurement and data analysis. The capacity to work with a group is also required.

Conditions for application

Before to apply, it is strongly recommended to contact the scientific in charge of this offer.

Defence Security:

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorization to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy:

As part of its diversity policy, all Inria positions are accessible to people with disabilities.

Warning: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.
or to analyze them together from the start. We can also use different datasets as means of validation to increase the confidence in the results.

2. Improve the methods of the original measurement tools, so that we can better correlate data points coming from different tools for a single user and across users. It is often hard to identify a single user or a single service in the datasets (for technical and privacy reasons), so we must develop means of correlating across users/services without jeopardizing privacy.

3. Design and develop methods to infer properties per access ISP or service. We aim to understand the performance of different access ISP and services (Are users getting what they pay for? Which is the best ISP/service at any given region?) as well as their traffic differentiation rules (Do ISPs treat traffic from a video streaming service better or worse than their own video streaming service?).

4. Leverage the variety of measurements coming from the different tools to detect network degradations and understand their root causes, and identify the most important factors that determine the quality of experience as perceived by end users.

**Main activities**
The candidate will carry out the above analysis and will be asked to propose the required statistical methods for an efficient combination of the existing datasets and inference of network performance related issues. We are particularly interested in those performance issues impacting quality of experience for Internet access as a whole or for particular Internet applications as VoIP or Video Streaming.

**Skills**
Technical skills and level required: Internet measurement, statistical data analysis, machine learning

Languages: English

Relational skills: Capacity of work within a group

**Benefits package**
- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

**Remuneration**
Gross Salary: 2650 brutto per month