Matthieu Gouel | Researcher

matthieu.gouel@protonmail.com • matthieugouel

Experience

Cloudflare **Paris, France**
Research Fellow *2023 - Pesent*

Embarking on a three-month program with Cloudflare's research team. Analyzing network measurement data to enhance the performance and reliability of Cloudflare's products.

Sorbonne Université **Paris, France**
Ph.D. Student *2020 - 2023*

Ph.D. student in the Network Performance Analysis (NPA) team at the LIP6 lab, also affiliated with LINCS lab, under the guidance of Dr. Olivier Fourmaux and Dr. Timur Friedman. My research focused on analyzing internet features through active and passive measurements. This included studying the IP-level, router-level, and AS-level topology, as well as geolocating infrastructure IP addresses.

- Development of a multi vantage-points measurement platform for IP-level internet topology discovery using **Python**, **ClickHouse**, **Redis**, **JavaScript** and **AWS/GCP** cloud infrastructures.
- Development of a **reinforcement learning algorithm** to allocate probing directives more efficiently.
- Development of a framework for large-scale traceroute processing.
- Analysis of the dynamics of an IP geolocation database.
- Study of **topology dynamics** and **measurement ethics** at Naval Postgraduate School (Monterey, CA).
- Co-organizer of LINCS Internet Measurements reading group.

LIP6 **Paris, France**
Research Engineer *2019 - 2020*

Worked in the Network Performance Analysis (NPA) team of the LIP6 laboratory and specifically in the Dioptra research group. Helped in the engineering of ongoing research projects in **Python** and **C++**, developed and maintained measurement infrastructure in a production environment using **Docker**, **Kubernetes** and **GitHub Actions**.

- Participated in ongoing researches about IP-level internet topology, IP geolocation and Alias Resolution.
- Building and maintaining the network measurement infrastructure.

Société Générale **Paris, France**
DevOps Engineer *2018 - 2019*

Worked inside an agile software development team for a global private cloud development project. This team was responsible for network-oriented capabilities of the cloud. I was the lead developer of the team and built APIs in **Python** which communicate with Avi Networks appliances. I also developed and open-sourced a **Python** package to facilitate API end-to-end testing.

- Development of APIs in **Python** providing SDN capabilities for the internal private cloud.
- CI/CD of programming projects using **Github Actions**, **Ansible** and **Jenkins**.
- Organized according to Scrum and SAFe agile methodologies.

French Ministry for Armed Forces **Paris, France**
Network-oriented Software Engineer *2016 - 2018*

Worked in a team managing network infrastructure for Data-Centers and Campus. My main role was to bring development skills to automate network infrastructure deployment and maintenance in operational conditions. I also participated to networking troubleshooting and on-call duty periods.

- Development of network automation software in Data-Center and Campus networks in **Python**, **Go** and **JavaScript**.
- Deployment with **Docker**, **Kubernetes** and **Gitlab CI**.
- Network administration and development in production environment.

French Ministry for Armed Forces — **Paris, France**
Network-oriented Software Intern, 6 month — *2016*

Internship at the end of the engineering school. The project was to develop a proof-of-concept networking solution to do routing in Data-Centers with BGP on Cisco/Arista hardware. The solution had to be automated using **Python**, **Ansible** and Zero-Touch provisioning.

- Automation of a BGP "Top of Rack" solution into Data-Centers.

EBRC — **Luxembourg**
Software Intern, 3 month — *2015*

Internship during the second year of engineering school. The project was to develop a knowledge system to help security operators to keep track of internal procedures. Developped in **Python** and **JavaScript**.

- Development of a knowledge database system for security operations in a Security Operation Center.
- Integration in a production environment.

Education

Ph.D. — **Computer Science**
Sorbonne Université, Paris, France — *2020–2023*

Masters degree (Diplôme d'ingénieur) — **Networks and Security**
Télécom Nancy, Nancy, France — *2013–2016*

Preparatory Classes — **Physics, Technology and Engineering Science**
Blaise Pascal School, Rouen, France — *2010–2013*

Publications

Replication: Towards a Publicly Available Internet scale IP Geolocation Dataset
O Darwich, H Rimlinger, M Dreyfus, M Gouel, K Vermeulen
ACM Internet Measurement Conference (IMC), 2023

Poster: Towards a Publicly Available Framework to Process Traceroutes with MetaTrace
M Gouel, O Darwich, M Mouchet, K Vermeulen
ACM Internet Measurement Conference (IMC), 2023

Vers des mesures haute fréquence d'internet plus éthiques
M Gouel, K Vermeulen, H Rimlinger, O Fourmaux, T Friedman
CoRes, 2023

Zeph & Iris cartographient l'internet
M Gouel, K Vermeulen, M Mouchet, J P Rohrer, O Fourmaux, T Friedman
CoRes, 2022

Zeph & Iris map the internet: A resilient reinforcement learning approach to distributed IP route tracing
M Gouel, K Vermeulen, M Mouchet, J P Rohrer, O Fourmaux, T Friedman
ACM SIGCOMM Computer Communication Review (CCR), 2022

IP Geolocation Database Stability and Implications for Network Research
M Gouel, K Vermeulen, O Fourmaux, T Friedman, R Beverly
Network Traffic Measurement and Analysis Conference (TMA), 2021

Alias Resolution Based on ICMP Rate Limiting
K Vermeulen, B Ljuma, V Addanki, M Gouel, O Fourmaux, T Friedman, R Rejaie
Passive and Active Measurement Conference (PAM), 2020

Teaching

Networks Architecture — **Sorbonne Université**
Master's degree program, Teaching assistant (40h/year) — *2019, 2020, 2021, 2022*

Internet Measurements — **Sorbonne Université**
Master's degree program, Teaching assistant (28h/year) — *2019, 2020, 2021*

Routing in networks — **Sorbonne Université**
Master's degree program, Teaching assistant (36h/year) — *2019*

Programming elements — **Sorbonne Université**
Licentiate degree program, Teaching assistant (20h/year) — *2022*

Open Source

https://github.com/matthieugouel

High-speed internet-scale measurement platform
Iris (in *Python*): allow to perform internet-scale multi vantage-points IP-level measurements (accessible here).

Reinforcement learning algorithm
Zeph (in *Python*): maximize the coverage IP-level topology measurements.

API end-to-end testing
Spintest (in *Python*): package to easily perform functional scenarios to test APIs.

Hobby projects
Gibica (in *Python*) and Bjorn (in *Rust*): toy programming languages interpreters.
Alchina (in *Python*): implementation of classic machine learning algorithms.

Languages

English: Fluent — *Full professional proficiency*

French: Native speaker — *Full professional proficiency*