Research topics	Distributed Computation, Communication-Computation-Learning over Networks
Position (M/F)	PhD, thesis offer
Reference offer	CS/DM/DistComp/032026
Research Department	Communication Systems
Publication date	24/03/2026
Start date	06/2026
Type of employment contract	Fixed-term doctoral position in private law

Description

Communication networks, such as wireless ad hoc or cellular networks, are being increasingly used for computation purposes. Representative examples are over-the-air computing, computing via gossip motivated by sensor networks, holoportation, and interactive communication. When the functions of interest are linear, in special instances, there exist algorithms to efficiently solve the problem. Computation tasks such as ranking of sources, and compressive sensing across networks, or even modeling the link delay or the probability of outage, as well as precoding for efficient data transmission, are only but a few of the many examples of nonlinear functions of interests over communication networks. For executing them, while parallel computing or replication-based techniques, e.g., MapReduce, and scheduling or pipelining have been exploited, physical constraints, such as bandwidth, power, and routing complexity, hinder their scalability. Devising low-complexity algorithms is formidable as existing coding principles cannot be simply extended to nonlinear computing scenarios. We envision a distributed framework for computing functions of data over communication networks. Our objective is to create a unified framework for distributed function computation in networks. Looking beyond the current research horizon, we envision a radically new approach to design our framework which involves a careful balance between data, function, and network. We target the emerging frontier research field of distributed functional compression over networks, which capitalizes on finding the shortest length explanation of a function in the number of exchanged communication bits over a network.

In this thesis, the PhD student will take a deeper look at distributed computing problems over wireless networks. The student will develop a background on the theoretical limits of communications when communication networks are tailored for performing specific tasks. Consider a scenario where distributed sensors collect the temperature information from a large geographic region. Their goal is to send their local observations to a common access point whose objective is to decide whether the temperature is above a critical threshold, e.g., heat wave. One trivial way for making this decision is via letting each sensor to transmit the entire information, which of course is a redundant approach from an energy efficiency perspective, and at the same time vulnerable to malicious users (if any). We seek ways of compressing the redundant information among dispersed sensors in a robust manner by exploiting the structural correlations between their measurements.

More specifically, the goal of this PhD thesis is to design low complexity coding techniques for computation over communication networks. This research area brings together tools from information theory and graph theory, and has applications in in edge/cloud computing scenarios, large language models, task-oriented communication and learning, fundamental limits of computation, decentralized and federated learning, intelligent communication systems, and sensing and connected robotics.

The PhD position is as part of a HUAWEI grant on Advanced Wireless Systems with a focus on fundamental limits of distributed computation over networks and computation-communication-learning tradeoffs. The position is intended for talented researchers with the drive to push the knowledge frontiers in the area of advanced wireless networks.

Requirements

- Education Level / Degree: Masters and Undergraduate degree in Electrical Engineering or in Mathematics
- Field / specialty: Mathematics, Electrical Engineering, Computer Science, Information Theory
- Other skills / specialties: Strong Mathematical Background in analysis and linear algebra
- Other important elements: Strong Academic and Algorithmic Skills, Motivated and Eager to Solve Problems, Motivated to Establish a Solid Foundational Background.

Application

The application must include:

- Detailed curriculum,
- List of publications specifying the three most important publications,
- Motivation letter of two pages also presenting the perspectives of research and education,
- Name and address of three references.

Applications should be submitted by e-mail to secretariat@eurecom.fr with the reference : CS/DM/DistComp/032026

About EURECOM

EURECOM is a major Engineering School and a Research Center in digital sciences founded in 1991 as a consortium in the international technology park of Sophia Antipolis. The IMT is a founding member of the GIE. Teaching and research activities are organized around 3 promising fields: digital security, communication systems and Data Science.

EURECOM has a staff of 190 (researchers and support teams) and welcomes 400 international students on the Campus Sophia Tech, the largest information science and technology campus of the region. EURECOM enjoys a privileged geographical environment on the French Riviera (Côte d'Azur), between sea and mountains, at the heart of a dynamic and multidisciplinary ecosystem that promotes high-level scientific and technological innovation.

Social advantages

- International and multicultural environment
- Attractive salary - Corporate saving plans
- Employee profit sharing policy
- Company health insurance (mutuelle) with high levels of guarantees for the whole family (employer participation of 60%)
- Restaurant vouchers (employer contribution of 60%)
- Corporate and Social Council (CSE)

EURECOM is one of Europe's leading engineering schools specializing in digital technologies. It is located in the heart of the Côte d'Azur, in Europe's Silicon Valley (Tech Park Sophia-Antipolis). EURECOM's research teams work in an international, multicultural environment.

EURECOM has a dynamic policy in terms of inclusion and quality of life at work. We are committed to diversity and give equal consideration to all applicants, without discrimination. Above all, we look for competence and team spirit.

All our positions are open to people with disabilities. EURECOM has set up a disability advisor to provide support and advice, organize accommodation and make positive commitments to personal integration.

As part of its gender equality plan, EURECOM encourages gender diversity within its teams. As part of our gender equality action plan, we encourage male applications for administrative positions, traditionally held by women, and female applications for IT and research positions, traditionally held by men.

EURECOM is taking positive action as part of its CSR policy. A CSR representative oversees EURECOM's CSR and energy transition policies (electric charging stations, solar panels, waste sorting, etc.).

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