
| | |
|----------------------------|--|
| Research topics | Multi-attribute suppression for speech privacy preservation |
| Position (M/F) | PhD studentship |
| Reference offer | SN/NE/PhD/SPPR/072024 |
| Research Department | Digital Security (SN) |
| Publication date | 04/07/2024 |
| Start date | Sept./Oct. 2024 |
| Duration | Duration of the thesis |

Description

Recordings of speech contain much more than the spoken content (words) but also, e.g., the voice identity, sex, health and emotional state, ethnic origin, geographical background, social identity and socio-economic status. Given the potential for such personal, private information to be estimated from speech data and then used for nefarious purposes, we are in need of privacy preservation solutions tailored to the speech medium. In moving far beyond studies of voice anonymisation which aim to obfuscate only the voice identity [1], the SpeechPrivacy project, funded by the French National Research Agency (ANR) is working to develop a flexible solution to privacy preservation based on isolated/disentangled representations and the selective obfuscation/modification of multiple attributes. Such a solution would enable, e.g., the user of a smart speech technology service to choose for themselves which privacy-sensitive attributes should or should not be provided to the service provider. The user will be able to select the attributes to be disclosed and those to be protected so that speech recordings sanitised of the selected privacy-sensitive attributes can then be entrusted to other parties without endangering user privacy.

EURECOM offers a fully-funded PhD position to work on the development of a framework for adversarial disentanglement and multiple attribute obfuscation. The work will begin with a study of single attribute isolation and representation. Before moving to multiple attribute obfuscation, we will need first to understand impacts of single attribute obfuscation upon other, potentially entangled attributes. This preliminary work will enable us to establish upper bounds on the potential for disentanglement. We will then investigate encoder-decoder frameworks using which an input speech signal can be sanitised of information relating to a set of selected, sensitive attributes. The idea is to build a bank of workers, each tasked with the learning of representations for a set of privacy-sensitive attributes. Each worker can then be combined with a set of auxiliary adversarial co-workers to encourage the learning of disentangled representations using which we can synthesize an output speech signal sanitised of the selected attributes, e.g. a new speech signal without age-related or sex-related information. The successful candidate will join the Audio Security and Privacy Group within EURECOM's Digital Security Department. You will work under the supervision of Profs. Nicholas Evans and Massimiliano Todisco and in collaboration with SpeechPrivacy partners, the Laboratoire Informatique d'Avignon (LIA) and the Laboratoire Lorrain de Recherche en Informatique et ses Applications (LORIA).

[1] Tomashenko, N., Srivastava, B.M.L., Wang, X., Vincent, E., Nautsch, A., Yamagishi, J., Evans, N., Patino, J., Bonastre, J.-F., Noé, P.-G., Todisco, M. (2020), "Introducing the VoicePrivacy Initiative", in Proc. Interspeech 2020, 1693-1697, available from https://www.isca-archive.org/interspeech_2020/tomashenko20_interspeech.html

Requirements

- Education Level / Degree : Master's degree
- Field / specialty: Computer Science, Artificial Intelligence, Speech Processing
- Technologies / languages / systems: machine learning, deep learning, Python and PyTorch
- Other skills / specialties: strong mathematics, analytical, problem solving, communications and writing skills
- Other important elements: an excellent academic track record, proficiency in English



Application

The application must include:

- Detailed curriculum,
- 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:
SN/NE/PhD/SPPR/072024

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 150 (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
- Private retirement plan (executive, employer participation of 100%)
- 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%)

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.).

Web site EURECOM: <https://www.eurecom.fr/fr/eurecom/presentation>

EURECOM in VIDEO: <https://www.youtube.com/watch?v=ullFcgNijnM>

Employee experience:

<https://www.youtube.com/watch?v=glTWTVRqLpc>

<https://www.youtube.com/watch?v=BHv9zlduzuQ>

<https://www.youtube.com/watch?v=hvbzzCBups8>