Eklavya Sarkar

PhD Candidate

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Nationality: Swiss

Research Interests

Self-Supervised Learning, Speech Processing, Computer Vision, Deep Learning

Work Experience

2021–Present **Research Assistant (PhD Candidate)**, *Idiap Research Institute*, Martigny, CH
Supervisor: Dr. Mathew Magimai Doss, Senior Researcher, Speech and Audio Processing.

- *Thesis*: Machine learning for analyzing human and non-human vocal communication.
- *Topics*: Speech processing, bioacoustics, self-supervised learning, human and non-human vocal communication, caller detection, calltype and gender classification.

2020 – 21 **Research Intern**, *Idiap Research Institute*, Martigny, CH
Supervisor: Dr. Sébastien Marcel, Senior Researcher, Biometrics Security and Privacy.

- Designed and implemented novel generative models by adding losses to StyleGAN2.
- Investigated vulnerabilities of modern facial recognition systems against deepfake attacks.

2017 **Research Intern**, *CERN*, Geneva, CH
Supervisor: Dr. Archana Sharma, Principal Scientist, CMS Experiment.

- Refined production code efficiency by completing pull requests on data acquisition tools.
- Contributed to open-source data acquisition tools and radiation physics R&D experiments.

Education

2021–Present **PhD Machine Learning**, *Ecole Polytechnique Fédérale de Lausanne*, CH, (5.2/6.0).

2018 – 19 **MSc Data Science**, *University of Bath*, UK, Distinction.

2015 – 18 **BSc Computer Science**, *University of Liverpool*, UK, Distinction.

Publications

Interspeech **Sarkar, E.** , Magimai-Doss, M. (2024), *On the utility of Speech and Audio Foundation Models for Animal Call Analysis.*

SPL **Sarkar, E.**, K. Wierucka, J. M. Burkart, Magimai-Doss, M. (2024), *On Feature Representation for Marmoset Vocal Communication Analysis.*, (In review)

Interspeech **Sarkar, E.**, Magimai-Doss, M. (2023), *Can Self-Supervised Neural Representations Pre-Trained on Human Speech distinguish Animal Callers?*

Interspeech **Sarkar, E.**, Prasad, R., Magimai-Doss, M. (2022), *Unsupervised Voice Activity Detection by Modeling Source and System Information using Zero Frequency Filtering.*

ICASSP **Sarkar, E.**, Korshunov, P., Colbois, L. and Marcel, S. (2022), *Are GAN-based Morphs Threatening Face Recognition?*

Thesis

MSc Optimising Facial Information Extraction and Processing using Deep Learning.
Grade: Distinction.

BSc Unsupervised Learning: Kohonen Self-Organizing Maps.
Grade: Distinction (90%).

TM Exoplanets: Discoveries and Prospects.
Grade: Distinction (6/6).

Academic Projects

RL **Flappy Bird Deep Q-Learning Network**
- Trained model to play Flappy Bird using a DQN, and surpassed human level performance.
- Refined optimal policy with Experience Replay and Deep Deterministic Policy Gradients.

NLP **Open Information Relation Extraction**
- Summarised body of text by training a ML speech tag classifier using Glove word vectors.
- Improved model by coding backtracking, Viterbi algorithm, Adam optimiser from scratch.

NLP **Toxic Comment Classification**
- Implemented approaches such as Log Regression, Trees, LSTMs, Naive-Bayes.

Leadership Experience

2022–24 **Organizer**, *Perspectives on AI Symposium Series*, Idiap Research Institute.
- Participated in organization: finding sponsors, budgeting, designing the event website.

2017–18 **President**, *Students Residence Society*, University of Liverpool
- Elected President of a student residence by ballot vote majority to represent 270 students.
- Led ten member committee, generated team vision, chaired meetings, managed events.

Academic Duties and Mentorship

Fall '21-24 **Lead Teaching Assistant**, Master in Artificial Intelligence, UniDistance Suisse
- Module: *Introduction to Speech Processing* (4 ETCS), by Dr. Magimai-Doss.
- Led TAs to grade assignments, exams, and provide critical feedback.

Exam Proctor, Ecole Polytechnique Fédérale de Lausanne.

Reviewer, IEEE Signal Processing Letters, IEEE Transactions on Technology and Society.

Awards

Aug 2020 **International Create Challenge**, *3rd Prize*, AI-Hackathon. Adversarial Attacks Detection.

Programming Skills

Languages Python, Java, Javascript, PHP, SQL, C++, C#, TEX, HTML, CSS.
Frameworks Hydra, PyTorch, Lightning, Optuna, Keras, SkLearn, D3.js.
Misc. Git, Unix, W&B, Mamba/Conda, SGE, Jupyter, Kaggle, Colab, xCode, Eclipse.

Languages

Fluent: English, French, Hindi. Intermediate: German.