University of Messina, Italy
Department of Mathematical and Computer Sciences,
Physical Sciences and Earth Sciences

Subject: Internship Proposal

ID	PTI_Ravi Daniele_16/07/2025 11.46.36
Data	16/07/2025 11.46.36

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Project details

Title	Privacy-Preserving Machine Learning in Clinical Brain MRI

Detailed description: Context and Motivation:
Medical imaging data is highly sensitive. Ensuring compliance with regulations (e.g., GDPR) and preventing patient re-identification is crucial when developing and deploying AI systems.

Internship Objectives:

- Comprehensive review of privacy-preserving AI techniques (differential privacy, federated learning, data anonymization).
- Implementation of differential privacy mechanisms in model training with adaptive privacy budgets.
- Study and development of tools to detect memorization or unintended retention of sensitive data.
- Benchmarking the trade-off between privacy and model accuracy for disease classification tasks.

Expected Outcomes:
- Working prototype integrating differential privacy for brain MRI tasks.
- Empirical assessments of accuracy vs. privacy.
- Best practices guidelines and documentation.

Duration (month – max 12)	6

Duration (hours)	150
Open positions	2

Internship Skills

Technical requirements: • Experience with privacy engineering, cryptography basics and near duplicated retrieval system • Machine learning model training (PyTorch or TensorFlow).	
Other skills	