

1 Human-centric explainable and efficient pervasive Artificial Intelligence

Abstract

AI systems are increasingly moving from a centralised, black-box approach to more decentralised approaches where "smaller" AI systems operate closer to the final users, possibly also on their own devices, and interact with each other, interpreting and anticipating human-users' behaviour. This falls under the umbrella of "human-centric AI", considering the next wave in the AI evolution. In this framework, it becomes fundamental to develop novel foundations and systems for lightweight AI models running on pervasive devices, including users' personal devices, where resource constraints (memory, computation, network) become an issue. Finally, it is fundamental to develop new forms or explainable AI models, taking into account (i) decentralised and un-controlled cooperation between pervasive devices and (ii) causality in the learning process.

Three topics are open in this area, both at the PhD and post-doc levels.

Topic 1.1 Human-centric Artificial Intelligence

Topic type: PhD or post-doc

We are looking for a PhD student or a post-doc working on decentralised forms of AI, where multiple "local" AI components interact with each other and combine local knowledge to come up with collective AI models. Human behaviour models will be used to drive the design and operations of both local and collective AI systems. The PhD activities will involve a mix of modelling, systems/algorithms design, prototype development, and performance evaluation via experiments, analysis, and simulation.

Topic 1.2 Causality-aware AI in pervasive environments

Topic type: PhD or post-doc

We want to move from learning correlations (as traditional, associations-based, machine-/deep-learning approaches do) to learning causal relationships. To this aim we propose to establish a synergy between a network of heterogenous electronic devices (smartphones, wearables, IoT devices, virtual assistants, etc.) and causal explainable AI, leveraging our hyperconnected environments to set up causal experiments and deploy the next wave of decentralized human-centric causal intelligent learning. The target use cases will be centered around pervasive systems. The research activities will involve theoretical modelling, systems/algorithms design, performance evaluation via experiments, analysis, simulation, according to the expertise of the candidate.

Depending on topic, the activities will be carried out in one or more of following European projects: CHIST-ERA SAI (Social Explainable AI, <https://www.sai-project.eu/>), HumaneAI-Net (<https://www.humane-ai.eu/>), SoBigData++ (<https://plusplus.sobigdata.eu/>), and MARVEL (<https://www.marvel-project.eu/>).

Candidate profile

Ideal candidates should have or about to obtain a MSc degree (for the PhD level) or PhD degree (for the Post-doc level) in Computer Science, Computer Engineering, Mathematics, or closely related disciplines, and a proven track record of excellent University grades (PhD level) or of publications in relevant top-tier

conferences and journals (Post-doc level). Preferably, the topic of the MSc/PhD thesis should be in one of the relevant research areas

- Topic 1.1: Artificial Intelligence, BigData analytics, distributed systems, Probability & Statistics
- Topic 1.2: Probability & Statistics, Artificial Intelligence, BigData analytics. Previous knowledge of causality theory is a plus

Good written and spoken communication skills in English are required.

Contacts

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