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AI4REALNET

AI FOR REAL-WORLD NETWORK OPERATION

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PURPOSE

The Project AI4REALNET covers the perspective of AI-based solutions addressing critical systems (electricity, railway, and air traffic management) modelled by networks that can be simulated, and are traditionally operated by humans, and where AI systems complement and augment human abilities.

These networks operated by humans, often combining human expertise with control and supervision software and different levels of automation, will face challenges in handling increasing uncertainty (e.g., from weather, assets aging, demand), combinatorial and sequential decisions to exploit network flexibility (and defer network reinforcements), and in human overseeing the increasing automation and intervene when required. In the AI4REALNET vision, high levels of human control and AI-based automation coexist with “optimal” balance. They are divided into a) full human control (AI-assisted), b) co-learning between AI and humans, including adjustable autonomy, and c) trustworthy (human-certified) full AI-based control.

GENERAL OBJECTIVES

It aims to achieve the following two strategic high-level objectives:

1) To develop the next generation of decision--making methods powered by supervised and reinforcement learning, which aim at trustworthiness in AI-assisted human control with augmented cognition, hybrid human-AI co-learning, and autonomous AI, with the resilience, safety, and security of critical infrastructures as core requirements, and

2) To boost the development and validation of novel AI algorithms by the consortium and AI community through existing open-source AI-friendly digital environments capable of emulating realistic scenarios of physical systems operation and human decision-making, enabling a direct assessment of AI-based decision quality.

SOCIETAL IMPACTS

- reduce the workload of human operators
- promote awareness of the benefits of AI systems
- facilitate continuing growth of air traffic demand while maintaining a high level of safety
- provide more flexibility and operational reliability to maximize the capacity of the current infrastructures
- support energy transition & increase resilience to natural and man-made hazards

SPECIFIC OBJETIVES

1. Develop an AI framework within the formalism of sequential decision-making
2. Design human-assistance and co-learning strategies
4. Create autonomous AI agents with safety and robustness
5. Validate the increase awareness of AI potential

EXPECTED OUTCOMES

- Journal and conference publications
- Open-source software
- New supervised and reinforcement learning algorithms
- New versions of AI-friendly digital environments
- Human-AI solutions to increase trustworthiness
- Validated AI-human interactions
- AI ecosystem around the digital environments
- Recommendations for policymakers in critical infrastructures and AI

General Indicators

17
Partners

8
Countries

6
Use Cases

6M
Budget

42
Months

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