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FAIR Future Artificial Intelligence Research

2nd Workshop on Green-Aware Artificial Intelligence (Green-Aware AI)

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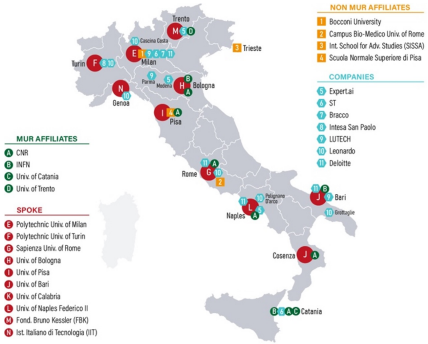
FAIR: Future Artificial Intelligence Research



Green-aware AI

FAIR Spoke 9, University of Calabria and ICAR-CNR:

- consider the "green dimension" design
- foundational aspects of green-aware AI agents and systems

FAIR: Green-aware AI

Mission: To promote the ethical, transparent, and sustainable development of Artificial Intelligence (AI)

- Foundation established in 2023 to ensure the responsible use of AI
- Involves universities, research centers, companies, public institutions
- Acts as a **bridge between research, innovation, and social impact**

Key areas:

- Social impact assessment of AI
- Development of sustainable AI solutions
- Education and awareness on ethical AI development

Sustainability Issues

- Energy Consumption[1]:
  - Training OpenAI's GPT-4 reportedly cost over $100 million and consumed around 50 gigawatt-hours of energy, enough to power San Francisco for three days.
  - Inference accounts for 80–90% of the total computing power used by AI systems.
  - By 2028, researchers estimate that power consumption for AI-specific purposes will rise to between 165 and 326 terawatt-hours per year.
- Fairness & Inclusivity
  - Bias hidden in training data can undermine underrepresented categories, hindering trust in AI adoption at scale.
  - The generation of stereotyped content by widely adopted AI models like LLMs can reinforce discriminatory dynamics.

[1] Estimates by *MIT Techology Review*

Sustainable Artificial Intelligence

- **Sustainable AI** refers to the development, deployment, and usage of artificial intelligence technologies in ways that are environmentally, socially, and economically responsible
- **Key principles:**
  - **Environmental responsibility**: minimize the energy consumption and carbon footprint of AI training and deployment
  - **Ethical practices**: ensure fairness, transparency, and accountability in AI systems to avoid perpetuating biases or harm
  - **Economic viability**: develop AI solutions that are cost-effective and accessible across diverse socioeconomic contexts

AI and Sustainability

AI for Green

AI technologies are leveraged to enhance environmental sustainability by enabling innovative solutions to address societal and ecological challenges

- **Energy optimization**
- **Climate modeling**
- **Resource management**

Green for AI

Green AI techniques can minimize the energy footprint of AI models, fostering their development and deployment, while democratizing their large-scale adoption.

- **Energy-efficient AI**
- **Edge AI**
- **Bias mitigation**

A virtuous cycle

- As **AI for Green** contributes to cleaner energy systems and reduced environmental impacts, it creates conditions (e.g., higher renewable energy availability) that support more sustainable AI practices under **Green for AI**
- Conversely, improvements in **Green for AI** lower the environmental footprint of AI technologies, enabling their broader use in sustainability initiatives under **AI for Green**

This cycle, when scaled, promotes an effective integration of technology and environmental responsibility, driving progress toward a more sustainable future

Workshop's numbers

- This is the **2nd** edition of the workshop. Past edition held in **Bolzano**, co-located with the AIxIA conference
- **17** accepted papers out of **23** submissions ($\sim$ **70**% acceptance rate)
- The Program and Organizing Committees include **26** members representing **12** institutions from around the world

Today's Program

- **09:00–09:10** Introduction
- **09:10–10:30** **Sustainabiliy** session
- **11:00–12:30** **Green AI** session – part I
- **14:00–14:45** Invited talk: **T. Eiter**, *The Bilateral AI approach for Green and Sustainable AI*
- **14:45–15:30** **Green AI** session – part II
- **16:00–17:30** **Application** session

Workshop Team

Enjoy the workshop!