NexTech 2024 & SoftNet 2024

Theme:
Artificial Intelligence as Game Changer - A Way to Sustainable Service Solutions

Moderator

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Panelists

- Dr. Tiago Espinha Gasiba, SiemensAG, Germany

- Dominique Briechle, Clausthal University of Technology, Germany

- Dipl. Ing. Peter Darveau, Centre for Advanced Computing, University of Ottawa, Canada

- Sr. Lect. Eric Innocenti, University of Corsica Pasquale Paoli, Corte, France

Artificial Intelligence: "The term 'artificial intelligence' means a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments." (*National artificial intelligence act of 2020)*

Sustainability: "Sustainability is about meeting the world's needs of today and tomorrow by creating systems that allow us to live well and within the limits of our planet."(*European Environment Agency, 2024*)

Environmental Crisis & Paris Goals

- The world faces an environmental crisis due to climate change.
- Paris Agreement targets: 1.5-2°C to prevent worst outcomes.
- Enormous efforts required: Energy transition, sustainable production, and consumption.

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AI Enables Simpler, Sustainable Solutions

- Digitalization helps but can be complex and inefficient.
- AI improves efficiency and user experience by automating processes.
- AI-driven systems: Smart grids, optimized agriculture, efficient supply chains.
- With AI, sustainable solutions become easier to adopt and more impactful.

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- **Artificial Intelligence recently imprinted strong changes in society**

- **However, *to which extent can AI be used in cybersecurity context*?**

  - **AI will change and keep on changing how we do cybersecurity**

  - **My view is that this can assist humans, but not replace them!**

Dr. Tiago Gasiba
Siemens AG

- **Things to watch out for**

  - **The collapse of AI ↦ training AI with AI**

  - **Undecidable problems ↦ human creativity required**

  - **Results based on random events?**

Theoretical limit?
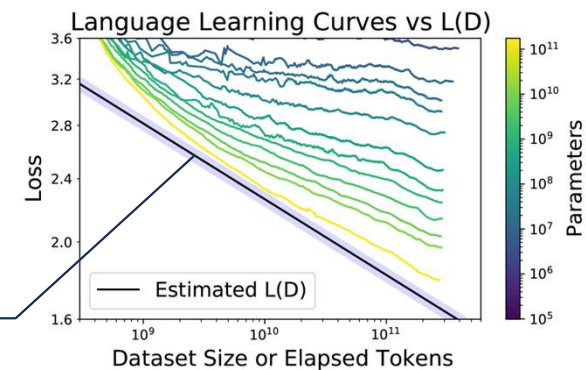
In: Henighan, Tom, et al. "Scaling laws for autoregressive generative modeling." *arXiv preprint arXiv:2010.14701 (2020).*

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IARIA

information

MDPI

Article

May the Source Be with You: On ChatGPT, Cybersecurity, and Secure Coding

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Dr. Tiago Gasiba
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- Automation
- Lower barrier
- Rapid prototyping
- Creativity / think outside of the box
- Ease of use
- Lowering workload
- Increased efficiency
- No fatigue

- Lack of skill and over-reliance
- Lack of context
  - Poor code quality
  - Insecure code generation
- Non-decidable problems
- Copyright and Privacy
- Semantics
- Recommendation bias

- AI plays a significant role in the future of humane society, compared by some to even having the same effect as steam engines had on the industrial revolution

- This includes the application to deal with complex scenarios, like the shift from a *Linear* to a *Circular Economy*

- Nowadays, AI is already applied in numerous cases as support or even decision making tools for enabling sustainable processes

- *Therefore, AI can not only act as a major propellant and game changer of technology and industry, but on a complete transformation of societies*
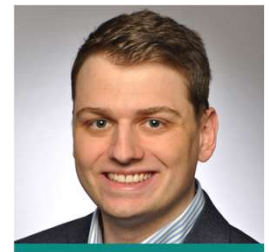
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Artificial Intelligence as Game Changer - A Way to Sustainable Service Solutions

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AI-driven sustainable service solutions will enable trustworthy and results-driven sustainable operations across industries and markets leveraging data, prediction models, and automation.

Sustainable Urban Development / Architecture

- AI-driven Urban Planning Predict and model the environmental impact of urban expansion, optimizing green spaces, and integrating sustainable infrastructure.
- Building Energy Efficiency - AI can optimize HVAC and lighting systems in buildings by analyzing occupancy patterns and weather forecasts.
- Architecture – BIM based on biological principles

  - Biological models using AI applied to construction requirements are key to finding new ways to sustainable construction practices I.e. alternatives to cement, stronger, more weather-resistant cellulose (wood), materials designed for carbon capture, etc.

  - Biomimetic principles go a step further implementing actuation. Those models can't be perfected without AI due to complexity of biological modeling of the material. Louver actuation, adaptive facades, luminescence

  - Holistic design of a specialized space (medical, geriatric, palliative care) is further developed and augmented by AI-Human collaboration. Design can include sensorial effects and air quality, VR etc.

  - Advanced BIM systems allow architects to design sustainable buildings with the right bio- friendly make-up for the esthetics and sensorial qualities (ontology) of a space. Reproducibility and security of the building design features are key

ESG, Addressing Asymmetries

- Responsible AI can provide clear and actionable guidance for firms and investors, enabling ESG to fulfill its promise. This carries more weight with institutional investors and incentivizes the pursuit of sustainability for the "greater good".
- The complexity of valuing ESG investments based on data from IoT can best be approximated with trustworthy AI models. This promotes standardized dollarization, increased trust in valuations and more sustainable markets.
- Study of environmental impacts are best handled by AI models using satellite imagery . Causal AI models for actionable ESG strategies with tangible outcomes using "what-if" scenarios.
- AI model specializations supporting ESG: optimization of locations, material science, biomimicry

Other Examples:
- AI-powered Carbon Accounting - Track and measure carbon footprints across industries, helping companies comply with environmental regulations and meet carbon-reduction goals
- Emission Reduction Solutions - Use AI to identify the most effective areas for emission reduction, whether through operational changes, supply chain adjustments, or alternative energy sources.

Energy Management and Optimization for Sustainability

- **Energy Storage Technology –** Improve efficiency of battery storage technology using AI to design optimal chemicals / compounds for optimal energy storage.

- **Smart Grid Management** - Use AI to optimize energy distribution in real-time by predicting demand, detecting inefficiencies, and routing electricity efficiently.

 - **Renewable Energy Forecasting** - Predict solar and wind energy availability to better integrate renewables into the energy mix and minimize the need for fossil fuels.

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- **Artificial Intelligence as Game Changer - A Way to Sustainable Service Solutions**

  - **Sustainability through AI:** *optimizing resources, circular economy, smart cities.*

  - **AI in manufacturing:** *predictive maintenance, efficient production.*

  - **Energy sector innovations:** *renewable energy optimization, smart grids.*

  - **Agriculture and Food Security:** *precision agriculture, sustainable food systems.*