Final workshop Hans Fischer senior fellowship Wil Schilders
Focus group: ‘’Scientific machine learning’’
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Auditorium TUM-IAS, Lichtenbergstrasse 2a, Garching

‘’Advancing Scientific Machine Learning in Industry’’

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Scientific machine learning (SciML) has been taking the academic world by storm as an interesting blend of traditional scientific modeling with machine learning (ML) methodologies like deep learning. While traditional machine learning methodologies have difficulties with scientific issues like interpretability, and enforcing physical constraints, the blend of ML with numerical analysis and differential equations has evolved into a novel field of research which overcome these problems while adding the data-driven automatic learning features of modern machine learning. Many successes have already been demonstrated, with tools like physics-informed neural networks, universal differential equations, deep backward stochastic differential equation solvers for high dimensional partial differential equations, and neural surrogates showcasing how deep learning can greatly improve scientific modeling practice. Consequently, SciML holds promise for versatile application across a wide spectrum of scientific disciplines, ranging from the investigation of subatomic particles to the comprehension of macroscopic systems like economies and climates.
However, despite notable strides in enhancing the speed and accuracy of these methodologies, their utility in practical and specifically industrial settings remain constrained. Many domains within the scientific community still lack comprehensive validation and robustness testing of SciML approaches. This limitation is particularly pronounced when confronted with complex, real-world datasets emanating from interactions between machinery and environmental sensors as usually addressed in industry. Still if appropriately addressed, SciML with its promise to accelerate innovations and scientific discoveries by orders of magnitudes, offers unique opportunities to address the insatiable desire for faster and more accurate predictions in many fields.
This workshop is dedicated to exploring recent advancements in the implementation of SciML techniques. It convenes leading experts who are actively engaged in refining these methodologies to ensure their practical viability and scalability, particularly in industrial sectors where digital and physical components converge. Goal of the workshop is to produce a research roadmap for advancing scientific machine learning in industry, addressing application/industrialization challenges.

More information to follow soon:
https://www.ias.tum.de/ias/research-areas/advanced-computation-and-modeling/scientific-machine-learning/