

Tutorial Proposal: AI-Enhanced ESG Data Management: Lifecycle, Challenges, and Large Language Model Frameworks

Abstract

Environmental, Social, and Governance (ESG) data has become a critical foundation for sustainable finance, corporate accountability, and responsible AI, yet remains fragmented, unstructured, and difficult to manage. This tutorial presents a unified perspective on AI-enhanced ESG data management, introducing a lifecycle framework that integrates large language models (LLMs) and modern data systems to support transparency, automation, and trust in ESG analytics. Building on recent advances in responsible data management and human-centric AI, we demonstrate how LLMs can extract, validate, and standardize ESG information across diverse sources and global regulatory frameworks (e.g., GRI, SASB, CSRD, ISSB), enabling efficient compliance checking, continuous monitoring, and real-time stakeholder engagement. Through theoretical foundations, system architecture, and industry case studies, the tutorial bridges AI, data management, and sustainability governance, offering participants practical insights into designing next-generation ESG intelligence platforms for trustworthy and socially beneficial AI applications.

Duration

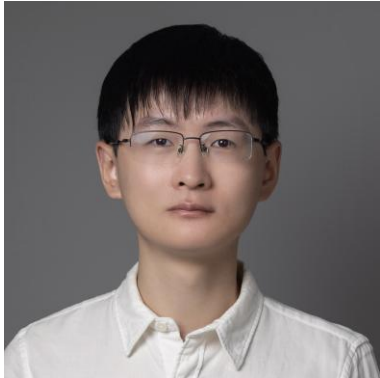
Total Time: 1.5 hours (90 minutes)

Outline

Time	Session	Content
0:00 – 0:15 (15 min)	Part I – Foundations of ESG Data Management	ESG principles and lifecycle overview (identification, measurement, reporting, engagement, improvement).
0:15 – 0:35 (20 min)	Part II – Challenges in ESG Data and Responsible AI	Heterogeneity, data quality, evolving standards, and responsible data management issues.
0:35 – 1:05 (30 min)	Part III – LLMs and AI Frameworks for ESG Intelligence	LLM-based extraction, compliance verification, report generation, and multi-agent architectures.
1:05 – 1:25 (20 min)	Part IV – Case Studies and	Industrial applications,

	Future Research	open challenges, and opportunities for responsible ESG AI systems.
1:25 – 1:30 (5 min)	Discussion & Q&A	Audience interaction and closing summary.

Organiser Biographies



Dr Zhengyi Yang

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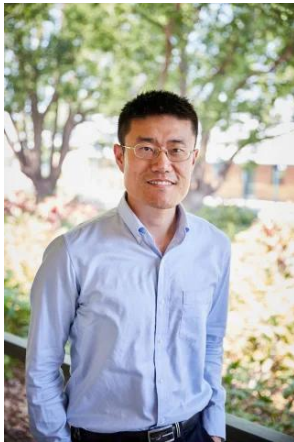
Dr Zhengyi Yang is an ARC Early Career Industry Fellow in the School of Computer Science and Engineering at the University of New South Wales (UNSW Sydney). He is also the Founder of Euler AI, a Sydney-based startup advancing AI-driven data analytics across diverse domain applications. His research focuses on efficient and scalable algorithms and systems for responsible data management. Dr Yang has published extensively in premier venues such as SIGMOD, VLDB, ICDE, WWW, and VLDBJ, and serves on program committees for ICDE, WWW, KDD, CIKM, and other major conferences. He has received three Best Student Paper Awards, including at ADMA 2025, ADC 2022, and KSEM 2020.



Dr Xiwei (Sherry) Xu

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Dr Sherry Xu is a Principal Research Scientist in the Applied AI Systems Research Team at CSIRO's Data61, an Adjunct Professor at the University of Tasmania, and an Adjunct Associate Professor at UNSW Sydney. Her work spans blockchain-based systems, software engineering for AI, and responsible AI architecture, advancing the principles and practices that bridge trustworthy AI and complex software systems. Dr Xu has published widely in top venues such as ICSE, ICSA, and BPM, authored *Architecting Blockchain-Based Applications* (2019), and contributed to the *Responsible AI Pattern Catalogue* and *Operationalizing Responsible AI* (2023).

**Dr Youqing Fan**

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Dr Youqing Fan is an Associate Professor at Western Sydney University. His research explores AI and algorithmic human-resource management, sustainable workforce development, and the ethical and social implications of AI in organizations, bridging management science and ESG research. He has published more than 40 papers in leading journals such as *Human Resource Management Review*, *Journal of Business Research*, and *Business Strategy and the Environment*. Dr Fan serves as Associate Editor for *Journal of Business Research*, *Australian Journal of Management*, and *Employee Relations*, and his research has been featured in ABC News, The Conversation, and the Sydney Morning Herald.