



COMPUTATIONAL SCIENCES AS A STRATEGIC RESEARCH FIELD

PEKKA NEITTAANMÄKI

Faculty of Information Technology
University of Jyväskylä
Seminaarinkatu 15 (Registry office and archive)
PO Box 35, FI-40014 University of Jyväskylä
Finland
(E-mail: pekka.neittaanmaki@jyu.fi)

Abstract. Computational sciences have emerged as a strategic research field that fundamentally transforms scientific inquiry, innovation, and societal development. Alongside theoretical and experimental approaches, computational science constitutes the third paradigm of science, enabling the modelling, simulation, and optimization of complex systems across disciplines. More recently, big data analytics has evolved into a fourth paradigm, emphasizing large-scale data integration, analysis, and predictive decision-making. This article examines the role of computational sciences in contemporary research, highlights their impact on scientific paradigms, and discusses how artificial intelligence and cognitive computing reshape research practices, interdisciplinary collaboration, and the role of the researcher in a data-driven society.

Communicated by Editors; Received June 7, 2026

AMS Subject Classification: Primary 65-02; Secondary 68T01, 68T09.

Keywords: Computational sciences, mathematical modelling, simulation, big data analytics, artificial intelligence, data-intensive research.