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A Robust Data Visualisation Technique for Data-Driven Decisions: Illustrations from Power Demand and Supply

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Ongoing technological advances in computing, data acquisition and the complex interactions of Sustainable Development Goals (SDG) create a natural Big Data environment for researchers and decision makers across fields and sectors to tap into. Identifying the triggers of SDG targets under such conditions is non-trivial, not only because of the large data dimensionality and non-orthogonality nature of the SDGs, but also due to the naturally arising data and information related gaps between data analysts and policy makers. We propose a cohesive data visualisation approach to bridging such gaps. The approach's main idea derives from a cohesion between technical and non-technical data generators and consumers. It is designed to provide a visual conduit between the two parties, hence facilitating unified understanding of the role and impact of the visualised data attributes. Visualisation of SDG-related data provides a natural interdisciplinary setting for stakeholders to gain actionable insights into important patterns across the SDG spectrum. Identification of relevant data attributes and the nature of their complex interactions are fundamental to creating robust data-driven solutions. Thus, given real-time access to the visual effects of a single or set of SDGs, decision-makers can quickly grasp the significance of key attributes and make informed strategic choices before it is too late. Most importantly, the cohesive approach potentially leads to a unified understanding of the SDG project across the globe, regions and within countries. Communicating information embedded into data attributes via interactive data visualisation is pivotal in optimising operational efficiency. It enables timely identification of bottlenecks, tracking performance metrics and making timely interventions. We illustrate the approach based on a large time-series dataset obtained from the South African utility giant, ESKOM <https://www.eskom.co.za/dataportal/>, covering the period 01 April 2020 to 31 March 2024. The choice is motivated by ESKOM's quest for stabilisation of the national electricity grid by balancing supply with the demand for electricity which can realistically be validated through visualisation and assessing demand forecasts. Visual patterns and forecasts show areas of attention, potential associations with other aspects of SDGs and highlight paths to a unified understanding of the triggers of SDG indicators, between data technocrats and decision makers, and open new paths to interdisciplinary research.

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