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Efficiency via Hierarchical Network Data Envelopment Analysis with Uncontrollable Input

Communication Info

Authors:
Anis Mardiana AHMAD[1]
Noor Saifurina NANA KHURIZAN [2]

[1] Faculty of Computer and Matematical Sciences, Universiti Teknologi MARA Kedah Branch, Malaysia
[2] School of Mathematical Sciences, Universiti Sains Malaysia, Penang, Malaysia

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Abstract

While Hierarchical Network Data Envelopment Analysis (HNDEA) is established as a superior alternative to black-box models [1, 2, 3] its discriminatory power under uncontrollable constraints across heterogeneous disciplines remains under-explored. This study applies an HNDEA framework to the higher education sector, integrating student dropout as an uncontrollable input across science and non-science faculties. This study integrates student dropout as uncontrollable factor into a HNDEA framework across science and non-science faculties. Model stability is verified via a "leave-one-out" sensitivity analysis on controllable outputs [4, 5]. Results indicate that this uncontrollable input induce significant rank reversals in non-science faculties, whereas science disciplines exhibit greater structural resilience. Analysis identifies undergraduate completion as a primary efficiency driver, while patents show minimal impact on ranking stability. These findings underscore the necessity of discipline-based classification for equitable benchmarking.

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