

RESEARCH ARTICLE | APRIL 20 2022

Hybrid data analytic technique for grading fairness Thepparit Banditwattanawong; Arnon Marco Polo Jankasem ; Masawee Masdisornchote  [+ Author & Article Information](#)*Data Technologies and Applications* (2023) 57 (1): 18–31.<https://doi.org/10.1108/DTA-01-2022-0047> [Article history](#) 

Purpose

Fair grading produces learning ability levels that are understandable and acceptable to both learners and instructors. Norm-referenced grading can be achieved by several means such as z score, K-means and a heuristic. However, these methods typically deliver the varied degrees of grading fairness depending on input score data.

Design/methodology/approach

To attain the fairest grading, this paper proposes a hybrid algorithm that integrates z score, K-means and heuristic methods with a novel fairness objective function as a decision function.

Findings

Depending on an experimented data set, each of the algorithm's constituent methods could deliver the fairest grading results with fairness degrees ranging from 0.110 to 0.646. We also pointed out key factors in the fairness improvement of norm-referenced achievement grading.

Originality/value

The main contributions of this paper are four folds: the definition of fair norm-referenced grading requirements, a hybrid algorithm for fair norm-referenced grading, a fairness metric for norm-referenced grading and the fairness performance results of the statistical, heuristic and machine learning methods.

Keywords: Student grading, Norm-referenced achievement, Fair assessment, Fairness measurement, Algorithm, Clustering, Z score, K-means, Heuristic, Hybrid technique, Ensemble technique, Decision function

© Emerald Publishing Limited

Licensed re-use rights only

You do not currently have access to this content.

Sign in

Don't already have an account? [Register](#)

Client Account

Email address / Username

Password

[Reset password](#)[Register](#)[Access through your institution](#)

Purchased this content as a guest? Enter your email address to restore access.

Email Address

Pay-Per-View Access £32.00[Buy This Article](#)**Rental**

This article is also available for rental through DeepDyve.

