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Data-Driven Analysis of Student Dropout Patterns in Higher Education Institutions in Nanded under NEP 2020

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Dr. Madhav M. Bokare[1]*, Amol V. Suryawanshi[2]

*Corresponding Author: [2]Department of Computer Science, SSBES' Institute of Technology and Management (ITM), Nanded, Maharashtra, India

suryawanshiamolv@gmail.com

[2]Department of Computer Science, SSBES' Institute of Technology and Management (ITM), Nanded, Maharashtra, India

ABSTRACT

Indian higher education has expanded rapidly, yet many students who enroll never complete their programme. This study examines who leaves, when and why, using records of ⟦2,416⟧ students admitted between 2021-22 and 2023-24 to ⟦8⟧ higher education institutions (HEIs) in Nanded district, Maharashtra. Because the National Education Policy (NEP) 2020 allows students to exit with a certificate or diploma, credentialed exits were separated from true dropout before modelling. Logistic regression, decision tree, support vector machine, random forest and XGBoost were compared using SMOTE and stratified 10-fold cross-validation. XGBoost performed best (F1 = ⟦0.84⟧, AUC = ⟦0.91⟧). SHAP analysis identified first-semester attendance, first-semester SGPA, scholarship disbursement delay, commuting distance and part-time employment as the strongest predictors, and association rule mining produced interpretable risk profiles. The dropout rate was ⟦12.9%⟧, and ⟦61%⟧ of dropouts occurred in the first year. The findings support a first-semester early-warning system built on data colleges already hold and linked to NEP 2020 provisions.

KEYWORDS: educational data mining; student dropout; NEP 2020; machine learning; explainable AI; SHAP; association rule mining; higher education; Nanded; Marathwada.

1. INTRODUCTION

According to the All-India Survey on Higher Education (AISHE) 2023-24, enrolment in Indian higher education reached 4.50 crore and the Gross Enrolment Ratio (GER) reached 30 (Ministry of Education, 2026). NEP 2020 targets a GER of 50% by 2035. Enrolment figures, however, count students at the door and say little about how many leave before finishing. The same survey round showed undergraduate enrolment falling for the first time, with Maharashtra among the states with the steepest decline (SuperKalam, 2026). Maharashtra's overall GER was

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