A

Major Project Report

on

A MACHINE LEARNING APPROACH FOR TRACKING AND PREDICTING STUDENT PERFORMANCE IN DEGREE PROGRAMS

Submitted to

Jawaharlal Nehru Technological University, Hyderabad

in partial fulfilment of the requirements for the award of Degree of

Bachelor of Technology

in

Computer Science & Engineering

by

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2022-2023

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the project entitled "**A MACHINE LEARNING APPROACH FOR TRACKING AND PREDICTING STUDENT PERFORMANCE IN DEGREE PROGRAMS**" is Submitted by ***K. Sruthi (196Y1A0593)***, ***S. Chandana (196Y1A0596)***, ***V. Deepika (196Y1A05B6)*** and ***V. Jahnavi (196Y1A05B3)*** in the partial fulfilment of requirement for the award of degree of Bachelor of Technology in Computer Science and Engineering during academic year 2022-2023.

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ABSTRACT

Accurately predicting students' future performance based on their ongoing academic records is crucial for effectively carrying out necessary pedagogical interventions to ensure students' on-time and satisfactory graduation. Although there is a rich literature on predicting student performance when solving problems or studying for courses using data-driven approaches, predicting student performance in completing degrees (e.g. college programs) is much less studied and faces new challenges: (1) Students differ tremendously in terms of backgrounds and selected courses; (2) Courses are not equally informative for making accurate predictions; (3) Students' evolving progress needs to be incorporated into the prediction. In this paper, we develop a novel machine learning method for predicting student performance in degree programs that can address these key challenges. The proposed method has two major features. First, a bilayered structure comprising of multiple base predictors and a cascade of ensemble predictors is developed for making predictions based on students' evolving performance states. Second, a data-driven approach based on latent factor models and probabilistic matrix factorization is proposed to discover course relevance, which is important for constructing efficient base predictors. Through extensive simulations on an undergraduate student dataset collected over three yearsat UCLA, we show that the proposed method achieves superior performance to benchmark approaches.

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