


Chapter 9

Hybrid Deep Learning for Predicting Student Engagement in Open Distance Education

Usharani Bhimavarapu

 <https://orcid.org/0000-0002-0246-1420>

*Department of Computer Science and Engineering, Koneru Lakshmaiah
Education Foundation, Vaddeswaram, India*

ABSTRACT

Open Distance Learning is a flexible learning approach whereby learners are exposed to learning material from a distance without the constraints of physical classrooms. In this research, student satisfaction with distance learning is investigated using a hybrid deep learning model consisting of a Bi-Stacked Gated Recurrent Unit (GRU) and ResNet. Data was collected from an online survey, cleaned to eliminate inconsistencies, and optimized by Ant Colony Optimization (ACO) feature selection. The Bi-Stacked GRU successfully learned sequential learning patterns, whereas ResNet learned deep features for improved classification performance. The combined model gave a combined view of student performance and engagement. Experimental results showed better prediction accuracy and interpretability, which proved the efficiency of the proposed method in assessing Open Distance Education.

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INTRODUCTION

Open Distance Education (ODE) is the delivery of learning activities outside the traditional classroom setting, where students learn from anywhere they can be. ODE involves the use of digital technologies, virtual learning modules, and online learning materials in an effort to make learning easier. ODE eliminates distance obstacles so that students in various locations have access to equal quality education. Dynamic nature of ODE means that the students can learn in their own time, in a way that work and other commitments suit. Firms offering ODE have advanced learning management systems (LMS) that organize the course material and tests. ODE is particularly beneficial to working professionals and the disabled. Unlike traditional learning, ODE supports asynchronous learning in which students access information at their own convenience. ODE uses interactive elements like forums and virtual laboratories to enhance engagement. Governments and learning institutions worldwide are adopting ODE for ease of access to education. ODE is getting better with advances in technology, offering more adaptive and personalized learning experiences.

Open Distance Education has become more essential due to the requirement for flexible learning. It is challenging for most individuals to access conventional institutions because they lack resources, they are engaged in working commitments, or they have family responsibilities. ODE is of immense value as it allows students to study at home or even in any place where they can find the internet. It also benefits those who are distant from conventional learning institutions and lack access to quality education. The COVID-19 pandemic also placed the need for distance education in the spotlight, with the institutions shifting to online methods in an attempt to maintain continuity. ODE fills learning gaps by making education affordable and accessible. Fully accredited online degree programs are now being conducted by most universities, increasing access to higher education. Organizations are also utilizing ODE for employee up-skilling and training. ODE supports effortless lifelong learning and professional development through the use of technology. Scalability in ODE has made it an economic solution for increasing educational coverage globally.

One of the greatest advantages of Open Distance Education is that it is inclusive, bringing learning to touch different populations. Traditional schooling keeps out individuals who cannot participate in mainstream classes due to disabilities, socio-economic conditions, or other personal commitments. ODE removes all such barriers by ensuring customized learning experiences that vary with needs. Students may be provided with learning material in numerous different forms, varying from video lectures to e-books and audio recordings. This approach accommodates several different learning types, allowing students to learn in their preferred way. ODE also promotes gender equality through enabling women, especially in conservative

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