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Employing Generative Adversarial Networks and Autoencoders for Student Engagement Detection: An Exploration of the DAiSEE Dataset

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ABSTRACT

In the swiftly evolving landscape of online education, understanding and enhancing student engagement has emerged as a critical challenge. However, traditional methods often fail to provide a comprehensive understanding of student behavior. This study presents a novel approach to monitoring student engagement by employing Deep Learning techniques, specifically Generative Adversarial Networks (GANs) and Autoencoders, utilizing the DAiSEE dataset.

This study used an Autoencoder model for anomaly detection to identify patterns of disengagement. Furthermore, this utilized GANs to generate synthetic data, addressing limitations presented by data scarcity. Despite the challenges inherent in training GANs, the model demonstrated a promising 97% accuracy rate in identifying real instances, although its ability to recognize fake instances necessitates further enhancements.

While these initial findings are encouraging, the research identifies several avenues for future enhancements, including expanding data collection, incorporating additional features, exploring other models and techniques, and fine-tuning the existing models. As such, the findings lay a solid foundation for future exploration in the domain of online education and deepen our understanding of the potentials of Deep Learning models in transforming this field.

Keywords: Student Engagement, Online Learning, Real Time Monitoring, Generative Adversarial Networks, Autoencoders, Anomaly Detection, Synthetic Data Generation, DAiSEE Dataset

Subject Descriptors:

1. Information systems → Information systems applications → Learning management systems
2. Applied computing → Education → Computer-assisted instruction → Interactive learning environments
3. Applied computing → Education → E-learning
4. Computing methodologies → Machine learning → Anomaly detection