

## Editorial

In an era characterized by rapid technological advancement and interdisciplinary collaboration, research endeavours continually push the boundaries of knowledge across diverse domains. The collection of these 4 papers featured in this issue embodies this spirit of innovation, offering novel insights and methodologies that address pressing challenges in fields ranging from biomechanics to healthcare and environmental science. From the development of modular estimators for precise joint motion analysis to the exploration of computational models for disease comorbidity identification, each paper reflects a commitment to advancing understanding and driving practical applications. As we delve into the intricacies of these studies, we embark on a journey through the frontiers of research, where curiosity, creativity, and cutting-edge technology converge to shape the future of science and society.

Estimating the intricate movements of human joints, particularly with high accuracy, poses a significant challenge. In this paper, the authors present a novel modular estimator tailored for estimating elbow joint motion. Notably, this estimator's modularity facilitates its adaptation for other joints, promising versatility across applications. The methodology integrates surface Electromyographic (sEMG) signals and motion capture data, enabling precise estimation of angular displacement and movement direction during elbow flexion and extension. Impressively, the classifier achieved estimation accuracies ranging from 80% to 90%, showcasing its potential for various Human-Machine Interface (HMI) applications [1].

Assessment methodologies profoundly influence student learning outcomes and experiences. This paper explores the efficacy of e-assessment via the Halomda educational platform in improving student performance and enriching learning experiences. Integration of ChatGPT with math exploration tools further enhances learning both in-class and remotely, while supporting educators in their assessment and feedback processes. The study's findings not only demonstrate improved student performance on final exams but also highlight a strong correlation between exam scores and continuous assessment grades, emphasizing the importance of holistic assessment approaches [2].

The stability of riverbanks in riparian zones is critical for environmental preservation and infrastructure development. This research presents a comprehensive investigation into riverbank slope stability, particularly along the Yellow River in China. By integrating empirical data with numerical analysis, the study unveils the intricate interplay of factors such as water level fluctuations, precipitation, and vegetation on slope stability. Notably, vegetation emerges as a significant factor in stabilizing riverbanks, especially during precipitation events. While acknowledging methodological limitations, the study underscores the relevance of these findings for informed decision-making in riverbank protection and infrastructure planning [3].

The COVID-19 pandemic has underscored the importance of understanding disease comorbidities for effective patient management. This paper presents a computational model designed to identify comorbidities associated with COVID-19 using transcriptome datasets. Through gene expression analysis and comprehensive data mining, the model reveals correlations between COVID-19 and various diseases, including acute myelocytic leukemia, urinary tract cancer, and diabetes mellitus. Notably, the model's insights pave the way for potential shared treatment strategies, offering prospects for improved patient care [4].

These research papers contribute significantly to their respective fields, showcasing innovative methodologies and yielding valuable insights. From advancements in joint motion estimation to the elucidation of disease comorbidities, each study addresses critical challenges with rigor and ingenuity. As we navigate an increasingly complex world,

interdisciplinary collaborations and technological innovations are paramount for driving progress and enhancing human well-being.

### References:

- [1] A. Y. Al-Maliki, K. Iqbal, G. White, "Estimation of Elbow Joint Movement Using ANN-Based Softmax Classifier," *Journal of Engineering Research and Sciences*, vol. 3, no. 4, pp. 1–9, 2024, doi:10.55708/js0304001.
- [2] P. Slobodsky, M. Durcheva, "Comprehensive E-learning of Mathematics using the Halomda Platform enhanced with AI tools," *Journal of Engineering Research and Sciences*, vol. 3, no. 4, pp. 10–19, 2024, doi:10.55708/js0304002.
- [3] M.T. Ahsan, J.-P. Wang, A. Dadda, "Numerical Analysis of Riverbank Slope Stability Considering Rainfall, Vegetation and Water Level Fluctuation," *Journal of Engineering Research and Sciences*, vol. 3, no. 4, pp. 20–31, 2024, doi:10.55708/js0304003.
- [4] S.B. Sen Omit, M. Mohiuddin, S. Akhter, Md.H. Imam, A.K.M.M.K. Habib, S.M.M. Hossain, N.K. Podder, "Computational and Bioinformatics Approaches for Identifying Comorbidities of COVID-19 Using Transcriptomic Data," *Journal of Engineering Research and Sciences*, vol. 3, no. 4, pp. 32–41, 2024, doi:10.55708/js0304004.

**Editor-in-chief**

**Prof. Paul Andrew**