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Editorial

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From the Editor

Cutting-edge research that combines the domains of artificial intelligence (AI), predictive analytics, cancer detection, and the Internet of Things (IoT) is the focus of current issue. The journal showcases advancements in tailored treatment strategies, early cancer detection, and the incorporation of IoT technology in healthcare by investigating creative uses of AI and predictive modeling. In order to enhance patient outcomes and promote the future of healthcare, we want to encourage cooperation and knowledge exchange between researchers, physicians, and technologists.

The paper titled, "A Framework for Analysis of SNPs in TAGAP Gene" provides a framework for analyzing single nucleotide polymorphisms (SNPs) in the TAGAP gene, with a focus on their structural and functional impacts. TAGAP, a protein involved in T cell regulation, is linked to autoimmune and infectious diseases. The research employs computational tools like SIFT, PolyPhen-2, PROVEAN, and I-Mutant 3.0 to study non-synonymous SNPs (nsSNPs) that potentially affect protein stability and function. Key findings include identifying nine deleterious nsSNPs associated with structural instability and potential disease pathways, including diabetes and multiple sclerosis. The study discusses TAGAP gene interactions, conservation analysis, and the role of harmful nsSNPs in protein dysfunction. However, it notes limitations such as computational bias, lack of experimental validation, and insufficient diversity in genetic datasets. The research concludes that deeper experimental analysis is required to improve the understanding of SNP-induced changes in TAGAP functionality and their broader implications in human health.

"Personalized Education Enhanced by AI and Predictive Analytics", discusses the use of artificial intelligence (AI) and predictive analytics to enhance personalized education through e-learning systems. It proposes a framework for recommending learning sequences to new learners based on historical data from previous learners. The study uses time-series analysis with two models, Vector Auto-Regression (VAR) and Auto-Regressive Integrated Moving Average (ARIMA), to analyze patterns in learning behaviors. Key findings indicate that the ARIMA model provides higher accuracy and a better model fit, while the VAR model captures more directional changes and explains more variance in the data. The research demonstrates how predictive analytics can personalize e-learning experiences, improve learning content organization, and offer tailored recommendations. Future extensions include customizing learning content, tests, and assignments, further enhancing education personalization.

The paper "Software-defined Network based Fog Computing for IoT Networks" presents a framework for secure fog computing in IoT networks using software-defined networking (SDN). It introduces a novel architecture combining SDN with fog computing to address challenges like scalability, latency, and security. Key features include Fog Management Nodes (FMNs) which manage access control and monitor fog nodes for trustworthiness. Newly connected fog nodes are assigned non-sensitive tasks and undergo trust evaluation based on their behavior. Weighted trust management and simulation add to this proposed framework and was tested using iFogSim, demonstrating effective detection and elimination of malicious fog nodes while maintaining secure interactions between nodes. The results highlight improved network security and reliability by combining SDN and fog computing, making the approach suitable for real-time IoT applications.

In the work titled, “Performance Evaluation of Machine Learning Models for Breast Cancer Prediction” evaluates the performance of six machine learning models—Logistic Regression, Support Vector Machine (SVM), K-Nearest Neighbors (KNN), Gaussian Naïve Bayes, Decision Tree, and Random Forest—for predicting breast cancer using the Wisconsin Diagnostic Breast Cancer dataset. The study aims to identify the most effective model for classifying breast cancer as malignant or benign by evaluating their performance across key metrics such as accuracy, precision, recall, F1-score, and ROC-AUC. Among the models, SVM demonstrated the best overall performance with a testing accuracy of 98.25%, a precision of 100%, and an F1-score of 97.83%. Logistic Regression, Random Forest, and KNN also performed well, though they were slightly outperformed by SVM. Decision Tree exhibited perfect training accuracy but struggled with generalization, indicating overfitting. The study concludes that SVM is the most reliable model for breast cancer prediction, particularly effective in minimizing false negatives, which is critical in healthcare. It underscores the importance of evaluating models across multiple metrics and ensuring generalizability rather than focusing solely on accuracy.

In “Optical Character Recognition for Nastaleeq Printed Urdu Text using Histogram of Oriented Gradient Features “the researchers explore a segmentation-free method for Optical Character Recognition (OCR) of Nastaleeq-printed Urdu text, leveraging Histogram of Oriented Gradients (HOG) and statistical features for ligature-based classification. Using the UPTI dataset, ligature images were segmented via connected component labeling and processed with an SVM classifier with an RBF kernel for recognition. The system achieved a 97.3%-character recognition rate, outperforming many previous methods. Key findings include the effectiveness of HOG features for classification, resilience to font size variations, and challenges such as over-segmentation and inability to process handwritten text. The study emphasizes automation in Urdu text digitization and suggests future work on handling text overlap, diacritics, and multi-font recognition.

To conclude, the articles featured in this issue underscore the transformative potential of artificial intelligence, predictive analytics, and IoT in addressing diverse challenges across healthcare, education, and network security. By leveraging AI-driven frameworks for cancer detection, SNP analysis, and personalized learning, alongside innovative architectures like SDN-based fog computing, these studies demonstrate how interdisciplinary approaches can drive impactful advancements. However, the need for experimental validation, diverse datasets, and real-world implementations remains critical to further refining these solutions. Through continued collaboration among researchers, technologists, and practitioners, these cutting-edge innovations hold promise for shaping the future of healthcare, education, and IoT-enabled networks.