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REVIEWER'S REPORT

Manuscript No.: IJAR-57534

Title: Artificial Intelligence-Driven Predictive Analytics Framework for Sustainable Geopolymer Concrete Using Agricultural Waste Materials

Recommendation:
Accept

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality	Yes			
Clarity		Yes		
Significance	Yes			

Reviewer Name: Dr. Ashish Yadav

Detailed Reviewer's Report

Reviewer's Comment for Publication.
Acceptance Comments are mentioned below suitable for the paper titled "Artificial Intelligence-Driven Predictive Analytics Framework for Sustainable Geopolymer Concrete Using Agricultural Waste Materials"

Reviewer Comments: Accept

Reviewer Comments –

Introduction
The manuscript presents a highly relevant study addressing the environmental challenges associated with conventional cement production and excessive carbon emissions in the construction industry. The introduction clearly explains the growing need for sustainable alternatives such as geopolymer concrete and effectively establishes the significance of incorporating agricultural waste materials including Sugarcane Bagasse Ash (SBA), Banana Peel Ash (BPA), and Fly Ash Type C polymer. The research motivation is well articulated, particularly regarding sustainable infrastructure and smart material optimization. The integration of Artificial Intelligence with construction material engineering is introduced in a logical and impactful manner.

Literature Review
The literature review demonstrates adequate coverage of existing studies related to geopolymer concrete, agricultural waste utilization, and Artificial Intelligence applications in sustainable construction materials. The authors effectively discuss previous research on machine learning techniques for predicting material properties and performance optimization in green construction practices. The review highlights the importance of Random Forest Regression models and predictive analytics in civil engineering applications. The identified research gap regarding limited intelligent predictive systems for geopolymer concrete is clearly justified. The section provides a strong theoretical foundation for the proposed research framework and supports the novelty of the study.

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Solution Approach

The proposed solution approach is technically sound, innovative, and practically implementable. The manuscript clearly explains the integration of Random Forest Regression models with predictive analytics pipelines developed using Python, Scikit-learn, FastAPI, and SQLite databases. The methodology for predicting compressive strength, flexural strength, and setting times across multiple geopolymer compositions is systematically described. The use of locally hosted predictive services enhances the practicality and scalability of the framework for sustainable construction applications. The approach effectively combines Artificial Intelligence techniques with environmentally responsible material engineering, demonstrating strong interdisciplinary research value.

Results and Discussion

The results and discussion section provides meaningful evaluation of the predictive analytics framework and demonstrates satisfactory model performance with approximately 75% predictive accuracy. The findings indicate that the proposed AI-driven system can effectively estimate key properties of geopolymer concrete while significantly reducing laboratory experimentation time and associated costs. The interpretation of compressive strength, flexural strength, and setting time predictions is clear and technically relevant. The discussion appropriately connects the experimental outcomes with sustainability objectives and material optimization strategies. The section successfully demonstrates the practical applicability of the framework in smart and green construction practices.

Conclusion

The conclusion effectively summarizes the major contributions and practical significance of the research. The study successfully demonstrates how Artificial Intelligence-driven predictive analytics can support sustainable geopolymer concrete development using agricultural waste materials. The framework offers a cost-effective and time-efficient alternative to traditional laboratory testing while promoting environmentally responsible infrastructure practices. The manuscript contributes to the advancement of smart material engineering and sustainable construction technologies. Overall, the research is innovative, technically relevant, and suitable for publication.