Jamia Millia Islamia, Central University, New Delhi

Notification No: - 587/2025

Notification Date:- 10/10.2025

Name of the Scholar: - Dr. Om Prakash

Name of Supervisors: Dr. Muzaffar Azim (Supervisor),

Prof. SMK Quadri (Co-Supervisor)

Name of the Deptt/Center: - FTK-Centre for Information Technology

FINDINGS

The dissertation redefines the scope of Cloud Computing as a linchpin in diverse applications, ranging from data analytics to artificial intelligence. Despite its transformative impact, the sustainability and efficiency of Cloud Computing are intricately tied to the challenges posed by resource management and environmental impact. In the same way that wireless sensor networks (WSNs) are essential for industrial automation, healthcare, and environmental monitoring, cloud computing provides the foundation for large-scale computation, data processing, and storage. But much like sensor nodes in wireless sensor networks (WSNs), cloud computing too has to deal with the need to reduce energy consumption and maximize resource use in its large data centers. The exponential growth of cloud services has introduced a profound challenge in the selection of reliable cloud providers. The intricate process of evaluating cloud services demands a meticulous decision-making approach from various perspectives. Current methodologies, however, exhibit significant complexity and limitations, thereby undermining the credibility of energy-efficient cloud selection processes.

This work addresses the need for more authentic decision-making outcomes and endeavors to enhance the Hybrid Machine Learning (ML)-based Energy Efficient Framework. In response to this challenge, a Nature-Inspired Energy Efficient Framework for Cloud Selection (NIEF-CS) is introduced in this research. Leveraging BAT-NN algorithms, the proposed model delves into the analysis of various risk factors to predict Energy Efficient Cloud Selection. Comparative analyses are conducted with established ML approaches, including Logistic Regression, KNN, Decision Tree, and MLP. A comprehensive literature review underscores the importance of refining cloud provider selection processes, revealing the existing gaps in current methodologies. The review highlights the need for innovative frameworks, such as NIEF-CS, that transcend traditional ML approaches and integrate nature-inspired algorithms to capture the multifaceted nature of cloud service evaluation.

This work contributes not only to the field of energy-efficient cloud selection but also addresses the broader discourse on advancing decision-making methodologies in the rapidly evolving landscape of cloud services. The research draws upon the UCI ML Repository and the QWS dataset, validating the efficacy of the hybrid learning approach. By showcasing the superiority of NIEF-CS in predicting energy-efficient cloud selections, the study provides valuable insights into optimizing cloud provider selection processes. This work serves as a critical step toward refining decision-making processes and promoting the adoption of innovative frameworks to navigate the complexities of the contemporary cloud services landscape.

The future endeavours outlined in this work aim to guide researchers in harnessing the potential of cloud computing with optimized energy utilization. By integrating efficient energy practices with cloud computing, the objective is to enhance the overall cloud usage experience for a broad spectrum of households. This, in turn, has the potential to elevate the quality of life for individuals and contribute positively to society at large.