

## **ADAPTIVE AI-BASED DEEP LEARNING MODELS FOR DYNAMIC CONTROL IN SOFTWARE-DEFINED NETWORKS**

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### **ABSTRACT**

*The ground-breaking development in recent years in network architecture is the concept of Software Defined Networks (SDN). However, the complexity of the modern networks and the dynamic characteristics of the traffic flow present great difficulties for traditional SDN control. SCHF and SGCM are, in turn, challenging these aspects; thus, this research proposes an adaptive AI-based deep learning model for dynamic control in software-defined networks, which tackles these aspects directly. The proposed model also aims to use complex deep-learning approaches in the optimization of network parameters within the shortest time possible. Immersing the adaptive mechanisms, the model can control the network conditions more effectively, and by doing so, it will always be more flexible than the currently existing SDN control techniques.*

*Therefore, it is envisaged that this research work constitutes a rigorous approach to the adoption, design, and assessment of this new paradigm for resource management using advanced deep learning architectures and reinforcement learning methodologies. A large number of simulations and experiments have been performed in order to prove the model's performance in different network conditions and different traffic loads. The experiments show substantial enhancements in primary indicators such as effectiveness, response time, and network load. Most notably, our proposed model demonstrates the improvement of overall network efficiency by up to 25% compared to existing solutions and thus marks the way for developing conceptually higher-level and self-adequate SDN management systems. It is essential to state that with this research, not only the field of AI-controlled network management is extended, but also numerous findings derived from this work can be considered rather helpful for those who are planning to implement such AI-based systems into operational Software-Defined Networks.*

**KEYWORDS:** *SDN, Machine Learning, Self-Organizing AI, Manage Control, Dynamic Allocation, Traffic Management, Multi-Layer Neural Networks, Machine Reinforcement Learning*

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### **Article History**

**Received: 10 May 2021 | Revised: 15 May 2021 | Accepted: 21 Jun 2021**

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