

The Synergistic Convergence of Generative AI, Evolutionary Computing, and Edge Intelligence: A Unified Framework for Next-Generation Financial Systems

Dr. B. Suresh Babu
Associate Professor

Department of Electronics and Communication Engineering
Viswam Engineering College, Madanappale, India
sureshdecs10@gmail.com

Abstract – This detailed paper is a synthesis of three paradigm shifts in technology, including Generative Artificial Intelligence (GenAI), Evolutionary Strategies (ES) of optimization, and Internet of Things (IoT)-enabled edge computing, to provide a conceptual framework that aligns and enables the transformation of financial services. The convergence between these areas is what makes them self-optimizing, adaptive, and generative in a financial ecosystem, and we establish the idea through a series of personal forays into each of them. GenAI delivers creative personalized products, synthetic data generation and ES delivers powerful hyperparameter and architectural optimization of executable financial models and the IoT-edge networks delivers contextual real-time data of the physical economy. We consider applications consisting of dynamically optimized edges deployed GenAI chatbots to respond to customer queries, evolutionary search to find the best hybrid financial model using the information of IoT sensors and market feeds, as well as using generative simulation to simulate complex financial situations to test their stress reactions. The framework considers the major issues such as the complexity of the system, distributed networks security, distributed networks computational performance and ethical control of independent financial agents. Using a highly diverse background of work in closely related areas as exemplified by radiomics in the healthcare system to resource allocation in VANETs we infer commonalities and new areas of integration. The paper concludes that this triple convergence is not just an evolutionary step of progress but a complete overhaul of the architecture of autonomous, resilient and hyper-personalized financial systems, and mapping a responsible innovation pathway that puts the possibilities of revolution on the scale of the safeguards required.

Keywords – Generative AI, Evolutionary Computing, Edge Computing, Financial Technology, Autonomous Systems, Synthetic Data, Hyperparameter Optimization, Distributed Intelligence, Convergence Technology.