AI-BASED MODEL AND INFORMATION TECHNOLOGY FOR CLOUD INFRASTRUCTURE ANALYSIS AND QUALITY IMPROVEMENT

Roman Dashkivskyy, Andrii Kopp
National Technical University «Kharkiv Polytechnic Institute», Kharkiv

The main criteria for services deployed in cloud infrastructure are cost-efficiency, reliability, and performance. Each of these aspects can be achieved independently by applying appropriate infrastructure components. For instance, fast execution is often ensured by the correct choice of compute instances and networking, whereas reliability can be enhanced via redundancy, and cost-efficiency through automation and dynamic scaling.

Cloud providers generally offer comparable core functionality across platforms. This allows for the development of vendor-independent models for infrastructure analysis and improvement. The proposed approach thus remains portable across AWS, Azure, GCP, and others.

Currently, most cloud vendors are beginning to integrate AI tools into their platforms (e.g., Copilot for Azure, GCP's AI Hub). However, these tools still operate mainly in Q&A format, answering user queries rather than proactively designing optimal infrastructure layouts or suggesting concrete improvements.
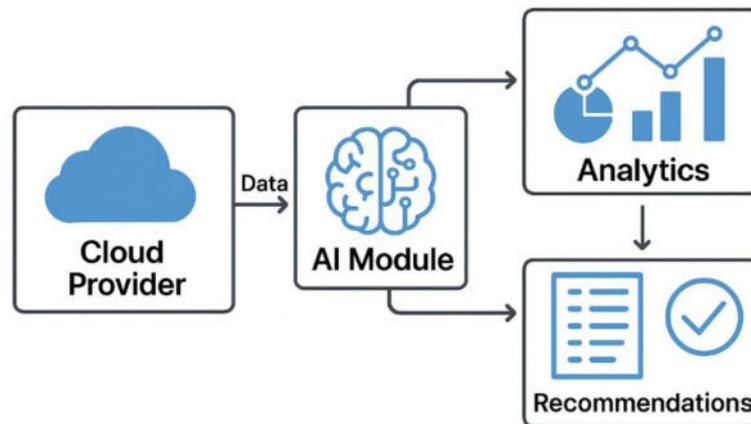

Fig. 1. – Flow of Data in an AI-Powered Cloud Analysis System

To address this gap, we propose an AI-based system that analyzes cloud infrastructure telemetry and suggests optimizations [1]. The system uses a combination of regression models and reinforcement learning to predict optimal configurations and dynamically allocate resources for cloud-native environments. Such a system not only improves infrastructure performance but also reduces human error in decision-making. Additionally, it enables proactive infrastructure management, allowing for real-time adaptation to changing workloads and business priorities.

As cloud environments grow in scale and complexity, AI-based control becomes an essential element of sustainable operations.

References:
1. Singh A. Optimization of the Cloud-Native Infrastructure using Artificial Intelligence. – 2023.