



AI4SIM

Montimage Smart Network Fuzzer

The Montimage Smart Network Fuzzer is designed to assess the robustness and security of connected systems. It operates at the network packet level, dynamically mutating real traffic using a closed-loop mechanism and harnessing AI-driven components to generate protocol-aware test cases, uncovering hidden vulnerabilities in diverse environments.



The AI4SIM solution provides:

- **Dynamic Adaptation:** Learns from responses to mutated packets in real time, enhancing effectiveness compared to static testing approaches.
- **Protocol-Agnostic & Intelligent Mutations:** Uses conditional GANs to create compliant yet diverse payloads; LLMs generate testing rules from protocol specs.
- **Realistic Testing Scenarios:** Injects authentic and synthetic traffic based on real-world behavior, improving the detection of subtle protocol flaws.



The Montimage Smart Network Fuzzer (aka NetworkFuzzer) is an innovative open-source tool for testing the security of network protocols by operating directly at the traffic level.

It goes beyond traditional fuzzers by using a feedback-driven, closed-loop mechanism: packet mutations are guided by observing the server's responses, allowing more directed and effective testing approaches.

Under the hood, this tool blends advanced AI techniques: it employs a Conditional Tabular GAN (CTGAN) to produce diverse and protocol-compliant test cases, and leverages Large Language Models (LLMs) to automatically derive mutation rules from protocol documentation. This strategic combination enhances the fuzzer's ability to uncover complex vulnerabilities that might elude conventional methods.

Designed for flexibility and realism, the fuzzer is protocol-agnostic but was showcased in a healthcare scenario using the DICOM protocol, demonstrating its capacity to simulate real-world attacks and synthetic traffic flows that challenge system robustness.



[YouTube Video Link](#)



The solution is still a prototype and the future tool will have commercial license. The Montimage Smart Network Fuzzer is hosted as an open-source project in Montimage GitHub repository under the Apache-2.0 licence.
<https://github.com/montimage-projects/networkfuzzer>



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[Manh-Dung Nguyen, Huu Nghia Nguyen, Lethycia Maia de Souza, Stylianos Karagiannis, Ana Rosa Cavalli & Edgardo Montes de Oca "An Intelligent Network Fuzzer for Protocol Testing in Healthcare Systems" in the ARES 2025 proceedings pp 213–231, Ghent, Brussels, August 11, 2025.](#)
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