Reboot and Recover: The Bacteriophage Initiative - Harnessing the Power of Biomimicry to Replicate Nature's Defenders and Revolutionize Cybersecurity Against Digital Threats

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As cyber threats like malware and ransomware evolve, traditional antivirus solutions struggle to keep pace. Inspired by bacteriophages, viruses that selectively target bacteria, this project develops an AI-driven antivirus that mimics their precision and adaptability. The program identifies malware through unique digital signatures, similar to how bacteriophages recognize host markers. Once a threat is detected, it generates customized countermeasures to neutralize it, adapting continuously to new threats. This enables proactive defense, particularly against polymorphic malware, which alters its code to evade detection. A prototype was developed and tested against a simulated malware dataset. Results demonstrated adaptive threat detection and effective neutralization, proving the potential for a scalable cybersecurity solution. By merging biology and computer science, this research introduces a novel biomimetic approach to cybersecurity. The AI-driven antivirus system offers intelligent, evolving protection, addressing the urgent need for adaptive, efficient, and scalable digital defenses in an interconnected world.

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