

Unified Reconnaissance and Vulnerability Assessment

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Abstract

Traditional cybersecurity assessment tools often rely on fragmented workflows, offer limited visualization, and fail to communicate risks effectively to management, leading to gaps in enterprise risk assessment. To overcome these limitations, this paper introduces URVA (Unified Reconnaissance and Vulnerability Assessment), a unified cybersecurity platform that integrates artificial intelligence, interactive graph analysis, and comprehensive reconnaissance. URVA follows a four-layer architecture that includes full-scale network reconnaissance with complete port coverage (1-65535), advanced OSINT collection, and detailed vulnerability assessment covering over 25 common security checks such as XSS, SQL injection, LFI, and CSRF. Its core innovation is the Intelligence Graph visualization system, which transforms complex security data into clear, actionable visual insights. The platform uses an interactive NetworkX-based graph to help security professionals identify attack paths, asset relationships, and vulnerability correlations that are difficult to interpret through traditional reports. In addition, an AI-powered analysis engine (using the Groq API) automates business impact assessment, remediation planning, and executive-level reporting, reducing report generation time from hours to minutes while maintaining accuracy. Evaluation results show that URVA provides deeper assessment coverage than conventional tools, while effectively bridging the communication gap between technical security teams and executive stakeholders. Its modular opensource design also supports future research in automated threat modeling, intelligent vulnerability prioritization, and real-time security visualization, positioning URVA as a strong advancement in enterprise cybersecurity assessment.

Keywords

Cybersecurity assessment, vulnerability analysis, network reconnaissance, intelligence visualization, penetration testing, security automation.

