

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 2, Issue 1, April 2022

Real-Time UX Behavior Analytics using Flask, Javascript Event Listeners, and Heatmap Rendering for Interface Refinement

Dheerendra Yaganti

Software Developer, Astir Services LLC, Frisco, Texas. dheerendra.ygt@gmail.com

Abstract: Enhancing user experience (UX) is a critical aspect of modern web application development. This paper proposes a real-time UX behavior analytics framework that leverages Python Flask for backend orchestration, JavaScript-based event listeners for interaction tracking, and heatmap libraries for intuitive visualization. The system captures granular user activity data, including mouse movements, clicks, scroll depth, and session duration, directly from the client-side environment. These events are transmitted asynchronously to a Flask-based RESTful API, where the data is processed, stored, and aggregated for analysis. To facilitate actionable insights, the framework incorporates heatmap rendering engines that visually map user interactions across the interface. This visualization aids in identifying user attention zones, interaction bottlenecks, and underutilized UI elements. The paper also presents post-session analytics capabilities, allowing designers to analyze engagement trends over time. Security and performance optimizations, including data anonymization and batch processing, ensure scalability without compromising responsiveness. Through a series of controlled deployments and iterative interface adjustments, the framework demonstrates measurable improvements in user engagement and navigation efficiency. This research contributes a modular, low-latency architecture that supports continuous UX refinement through real-time behavior analytics, offering developers a practical tool for data-driven interface optimization in modern web environments.

Keywords: User Experience (UX), Heatmap Visualization, JavaScript Event Tracking, RESTful APIs.

