UDC 004.78:069

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ANALYTICAL TOOLS FOR MONITORING THE POPULARITY OF CULTURAL EVENTS IN WEB SYSTEMS

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Анотація

У тезах розглядаються аналітичні інструменти, що застосовуються у веб-системах для моніторингу популярності культурних заходів. Проаналізовано основні підходи до збору та обробки даних, зокрема використання веб-аналітики, систем рейтингування та алгоритмів рекомендацій. Виявлено переваги та обмеження сучасних інструментів і окреслено напрями їх інтеграції у веборієнтовані інформаційні системи.

Ключові слова: веб-аналітика, культурні заходи, рейтингування, моніторинг популярності, інформаційні системи.

Abstract

The paper examines analytical tools used in web systems to monitor the popularity of cultural events. Key approaches to data collection and processing are analyzed, including web analytics, rating systems, and recommendation algorithms. The advantages and limitations of modern tools are identified, and directions for their integration into web-oriented information systems are outlined.

Keywords: web analytics, cultural events, rating, popularity monitoring, information systems.

Introduction

The growing role of digital platforms in cultural life necessitates the development of intelligent web systems capable of tracking, analyzing, and presenting information about cultural events. Cities host a wide variety of cultural activities – concerts, exhibitions, theatrical performances, and festivals – which generate substantial volumes of user interaction data. Monitoring the popularity of these events in real time enables organizers and city administrations to make data-driven decisions, improve visitor engagement, and optimize resource allocation. The relevance of this research is underscored by the increasing demand for transparent, efficient, and user-centered digital cultural infrastructure [1-2].

Types of Analytical Tools in Web Systems

Modern web systems employ a broad spectrum of analytical tools to measure and interpret user behavior. The primary categories include: web analytics platforms, rating and review aggregation systems, and recommendation algorithms.

Web analytics platforms, such as Google Analytics 4 and Matomo, collect quantitative data on user interactions – page views, session duration, click-through rates, and conversion funnels. These metrics allow system administrators to identify which events attract the most attention and at what stages users disengage [3]. Event tracking via custom dimensions enables the categorization of visits by event type, location, and time period, providing granular insights into popularity trends.

Rating and review systems constitute another critical analytical layer. Platforms that aggregate user-generated scores and comments enable comparative analysis of events across multiple dimensions, including overall satisfaction, venue quality, and thematic relevance. Weighted rating algorithms – such as the Bayesian average – mitigate the distortion caused by a low number of reviews and produce more reliable popularity rankings [4]. Sentiment analysis applied to textual reviews, using natural language processing (NLP) techniques, further enriches quantitative ratings with qualitative context.

Recommendation Algorithms and Behavioral Analytics

Collaborative filtering and content-based filtering are widely used in cultural event platforms to personalize recommendations and indirectly reflect event popularity [5]. Collaborative filtering leverages the behavioral patterns of similar users to suggest events, while content-based filtering matches events to user preferences

based on attributes such as genre, location, and artist. Hybrid approaches that combine both methods have demonstrated superior accuracy in predicting user interest in cultural activities.

Behavioral analytics tools – including heatmaps, scroll-depth tracking, and A/B testing frameworks – complement quantitative data by revealing how users interact with event listings at a micro-level. Tools such as Hotjar or Microsoft Clarity provide visual representations of user attention distribution, which can be used to optimize event presentation and improve discoverability. Real-time dashboards built on technologies such as Apache Kafka and Elasticsearch allow continuous monitoring of event popularity metrics with minimal latency [6].

Integration into Web-Oriented Information Systems

Effective integration of analytical tools into web-oriented information systems for cultural event management requires a layered architecture. The data collection layer captures raw interaction signals via APIs, tracking scripts, and database triggers. The processing layer applies statistical models and ML algorithms to transform raw data into meaningful popularity indicators. The presentation layer delivers visual analytics to administrators and, in aggregated form, to end users through interactive dashboards and public rating displays [2; 5].

Key challenges in this integration include ensuring data privacy compliance (GDPR), handling cold-start problems in recommendation systems for newly added events, and maintaining system performance under high traffic loads during peak cultural seasons. Addressing these challenges requires careful selection of tools and architectural patterns appropriate to the scale and goals of the target system.

Conclusions

The analysis demonstrates that monitoring the popularity of cultural events in web systems requires a combination of web analytics platforms, rating aggregation mechanisms, sentiment analysis, and behavioral analytics tools. Each category addresses a distinct aspect of popularity measurement and together they form a comprehensive analytical framework. Integrating these tools into a web-oriented information system enables real-time, data-driven management of cultural event visibility and audience engagement. Future work should focus on developing unified API-based integration protocols and privacy-preserving analytics approaches tailored specifically to the cultural sector.

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