Chapter 12
Predictive Analytics for Overtourism Management and Destination Resilience

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ABSTRACT

In the contemporary landscape of smart cities, large-scale events, retail complexes, transportation hubs, and entertainment venues, understanding and predicting visitor flow is critical for optimizing operational efficiency, enhancing safety, improving customer experiences, and supporting strategic decision-making. Data-driven visitor flow forecasting models leverage a combination of historical data, real-time observations, and advanced analytical techniques to predict patterns of human movement, congestion points, and occupancy levels. These models integrate data from multiple sources, including ticketing systems, IoT sensors, Wi-Fi and Bluetooth tracking, GPS-enabled devices, social media activity, and environmental factors, providing comprehensive insights into visitor behavior at both macro and micro

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levels.Historical data analysis forms the foundation of visitor flow forecasting. By examining past attendance patterns, seasonal variations, weekday versus weekend trends, and special events, predictive models identify recurring trends and baseline behaviors.

PREDICTIVE ANALYTICS FOR OVERTOURISM MANAGEMENT AND DESTINATION RESILIENCE

In the contemporary landscape of smart cities, large-scale events, retail complexes, transportation hubs, and entertainment venues, understanding and predicting visitor flow is critical for optimizing operational efficiency, enhancing safety, improving customer experiences, and supporting strategic decision-making. Data-driven visitor flow forecasting models leverage a combination of historical data, real-time observations, and advanced analytical techniques to predict patterns of human movement, congestion points, and occupancy levels. These models integrate data from multiple sources, including ticketing systems, IoT sensors, Wi-Fi and Bluetooth tracking, GPS-enabled devices, social media activity, and environmental factors, providing comprehensive insights into visitor behavior at both macro and micro levels.Historical data analysis forms the foundation of visitor flow forecasting. By examining past attendance patterns, seasonal variations, weekday versus weekend trends, and special events, predictive models identify recurring trends and baseline behaviors. Techniques such as time-series analysis, ARIMA models, and exponential smoothing capture temporal dependencies, while regression analysis and clustering methods reveal relationships between external factors—such as weather, holidays, and marketing campaigns—and visitor volume. (Allal-Chérif, 2022)Historical data enables organizations to anticipate peak periods, allocate resources efficiently, and proactively plan for contingencies.Real-time data integration enhances the accuracy and responsiveness of forecasting models.

Multi-source data fusion is critical for creating robust and accurate visitor flow models. Data sources may include electronic ticketing and reservations, point-of-sale transactions, mobile device tracking, public transportation usage, social media check-ins, and environmental sensors monitoring temperature, air quality, and lighting conditions. Integrating these heterogeneous datasets requires careful preprocessing, normalization, and alignment of temporal and spatial dimensions. Data fusion not only improves predictive accuracy but also enables multi-dimensional insights, such as understanding the relationship between environmental conditions, transportation availability, and visitor behavior patterns.Spatial modeling and simulation are key components of visitor flow forecasting. Geographic information systems (GIS), heatmaps, and agent-based modeling simulate crowd movement within a physical

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