Who Will Survive and Revive Undergoing the Epidemic: Analyses about POI Visit Behavior in Wuhan via Check-in Records

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A rapid-spreading epidemic of COVID-19 hit China at the end of 2019, resulting in unignorable social and economic damage in the epicenter, Wuhan. POIs capture the microscopic behavior of citizens, providing valuable information to understand city reactions toward the epidemic. Leveraging large-scale check-in records, we analyze the POI visit trends over the epidemic period and normal times. We demonstrate that COVID-19 greatly influences the society, where most POIs demonstrate more than 60% of visit drops during the city lockdown period. Among them, *Tourist Attractions* received greatest impact with a 78.8% drop. *Entertainment*, *Food*, *Medical* and *Shopping* are sensible to the disease before lockdown, and we identify these "early birds" to investigate the public reaction in the early stage of the epidemic. We further analyze the revival trends, generating four different revival patterns that correlated with the necessity of POI functions. Finally, we analyze the perseverance during the COVID-19, finding no large-scale closures compared with the tremendous visit drop. The strong resilience in Wuhan supports the rapid recovery of society. These findings are important for researchers, industries, and governments to understand the city respondence under severe epidemic, proposing better regulations to respond, control, and prevent public emergencies.

CCS Concepts: • **Applied computing** → **Sociology**; • **Information systems** → **Data mining**; • **Human-centered computing** → **Ubiquitous and mobile computing**.

Additional Key Words and Phrases: POI, check-in, time series analyze, COVID-19, data driven

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