# 5. Studying Hybrid Art Space: Methods and Case

The previous chapters have developed Hybrid Space as a socio-spatial condition (Chapter 3) and introduced Hybrid Art Space as a conceptual lens to understand how art, space, and platforms intersect (Chapter 4). Yet conceptual clarity is only part of the task: Hybrid Art Spaces are lived, designed, and contested in practice, and their study demands empirical methods. This chapter outlines how I empirically study Hybrid Art Spaces, presents the methodological framework, and uses Singapore as a case study.

## 5.1 How to Study Hybrid Space

Studying Hybrid Space means studying relations, not layers. The task is not to separate physical and digital domains, but to observe how they are co-produced in practice—through spacing and synthesis across embodied presence, interfaces, and imaginaries. This requires methods that are:

- **Multi-scalar**, able to capture both the micro-level (an Instagram post, a visitor's path through a gallery) and the macro-level (urban clusters, mobile territories).
- **Multi-modal**, drawing on text, images, geolocated data, institutional archives, and on-site observations.
- **Responsive**, attuned to the rapidly shifting platform environment, where APIs, metrics, and affordances are constantly in flux.

Social media data are particularly significant, not as transparent mirrors of reality but as traces of practice, fragments of how people perform, value, and negotiate art in hybrid conditions. My approach takes these traces seriously as indicators of spatial knowledge, while remaining critical of their biases (e.g., skewed toward the young, urban, and visually literate).

## 5.2 Singapore as a Case Study

When Singapore became independent in 1965, culture and the arts were far from political priorities. The young nation was preoccupied with housing, employment, and survival. The shift began only in the late 1980s, when the government began recognizing culture as a nation-building tool.

The turning point came in 1989 with the *Report of the Advisory Council on Culture and the Arts* (ACCA). The report proposed that culture could strengthen national identity, foster social cohesion, and even attract tourism. What Singapore lacked, it argued, were the spaces and structures to make this vision real. Its recommendations triggered a new phase of institution-building: the expansion of the National Museum, the construction of new facilities for the National Library, and the launch of the Arts Housing Scheme (National Art Council 2010), which offered artists and associations state-owned buildings—often historic shophouses—to convert into studios and small cultural centers.

The early 2000s marked a second wave. In 2001, the government launched the *Renaissance City Plan* (RCP)—the first of three successive blueprints (2001, 2005, 2008) (MITA, 2001; 2005, National Art Council 2008) that together invested over S$90 million in culture. The RCP explicitly linked culture to economic growth, creative industries, and global visibility. It called for a balance between "hardware" and "software": not only building museums, theatres, and archives but also cultivating audiences, talent, and entrepreneurial ecosystems. The idea of "creative city" (Landry 2006) emerged: districts where art, commerce, and lifestyle would intertwine to enhance urban life.

By 2012, a new paradigm had taken shape. *The Arts and Culture Strategic Review* (ACSR) (National Art Council 2012) shifted attention from state funding to private philanthropy and market-driven sustainability. Art was no longer confined to institutional clusters but began to permeate malls, public spaces, and the city center. *The Public Art Trust* (2014) (National Art

Council 2020) expanded this vision, commissioning art for everyday environments and encouraging the private sector to embed creativity into commercial developments, exemplified by the ION Art Gallery, built within a shopping complex on Orchard Road.

These national frameworks—ACCA, RCP, ACSR—set the strategic tone. At the spatial level, the Urban Redevelopment Authority (URA) translated them into master plans and conservation strategies. The 1986 *Conservation Master Plan* (National Library Board 2014) safeguarded heritage districts; the 1988 *Civic and Cultural District Plan* reimagined the downtown as an accessible cultural corridor (Urban Redevelopment Authority 1988); and the 1991 *Culture Master Plan* proposed a dual system: half of Singapore's cultural facilities centralized in the core, the rest distributed across suburban centers. Later, the 1997 *Museum Development Guide Plan* (Urban Redevelopment Authority 1997) fine-tuned this approach, envisioning a pedestrian-friendly cultural landscape.

Alongside these masterplans, the *Arts Housing Scheme* created visible "arts belts" across the city—Waterloo Street, Chinatown, and Little India—where state-owned buildings were repurposed to host studios, galleries, and associations. Over time, these districts became laboratories for cultural regeneration, but also sites of tension: gentrification, rising rents, and limited engagement with local communities diluted their initial promise.

In 2010, the *Framework for Art Spaces* introduced a more differentiated approach. Larger art societies were placed in central facilities, while smaller, shared clusters emerged in Goodman Arts Center and Aliwal Arts Center, designed for collaboration and cross-pollination. Together, these frameworks transformed Singapore's urban landscape, producing an archipelago of cultural infrastructures that would define the city's image in the decades to come.

A complex governance system supported this evolution. A new Ministry of Information and the Arts was established in 1990, later split into the Ministry of Culture, Community and Youth (MCCY) and the Ministry of Communications and Information (MCI), separating the domains of culture and creative industries. Beneath them, a network of statutory boards—the National Arts Council, National Heritage Board, National Library Board, Singapore Tourism Board, Design Singapore Council, and Infocomm Media Development Authority—coordinated the policies, often through joint initiatives.

By the mid-2010s, Singapore had become a city dense with cultural infrastructure and activity. However, the model's contradictions also became clear. Scholars described the city's cultural sphere as a "golden cage": nurtured by generous public support but constrained by tight regulation and limited artistic autonomy (Said 2017). While Singapore's global reputation as a creative hub grew, critical voices noted how state-led cultural production risked taming the spontaneity and dissent that often drive artistic innovation.

In 2015, Singapore's designation as a UNESCO *Creative City of Design* symbolized the culmination of these efforts, a city where cultural policy, urban planning, and technological modernity converge. However, beneath the polished image lies a more complex narrative: a decades-long experiment in engineering culture as infrastructure, where art is both a civic instrument and a mirror of the nation's evolving identity.

**Table 1. A timeline of cultural planning in Singapore, including the main plans, the establishment of different art-related governance boards, the construction of art-related infrastructures, the establishment of platforms to support culture and art, and the education. Tomarchio (2021).**

| YEAR | PLAN | YEAR FOUNDED | INFRASTRUCTURE | EVENT/PRIZE | EDUCATION |
|---|---|---|---|---|---|
| before | | Ministry of Culture, Community and Youth | | | Nanyang Academy of Fine Arts |
| 1938 | | | | Singapore Festival of Arts (biennial) | |
| 1964 | | Singapore Tourism Board | | | |
| 1979 | | | | Cultural Medallion | |
| 1983 | | | | Patron of the Arts | |
| 1984 | | | | | Lasalle College of the Arts |
| 1985 | Arts Housing Scheme (AHS) | | | | |
| 1986 | Conservation Master Plan | | | | |
| 1988 | Master Plan of the Civic and Cultural District | | | | |
| 1989 | Report on Advisory Council on Culture and the Arts (ACCA) | | | | |
| 1990 | | The Ministry of Information and the Arts (MITA) | | | |
| 1991 | Culture Master Plan | National Arts Council | | Singapore Writers Festival | |
| 1992 | | | | Young Artist Award | |
| 1993 | | National Heritage Board | One-Two-Six Cairnhill Arts Centre | Arts Education Programme | |
| 1995 | | National Library Board | | | |
| 1996 | | | | | |
| 1997 | Museum Development Guide Plan | | Telok Kurau Studios | | |

| YEAR | PLAN | YEAR FOUNDED | INFRASTRUCTURE | EVENT/PRIZE | EDUCATION |
|---|---|---|---|---|---|
| 1998 | Creative Singapore: A Renaissance Nation in the Knowledge Age | | | | |
| 1999 | | | | Singapore Arts Festival (annual) | |
| 2001 | The Renaissance City Plan I (RCPI) | | | | Yong Siew Toh Conservatory of Music |
| 2002 | Creative Industries Development Strategy: Propelling Singapore's Creative Economy | Arts House Limited under NAC | Esplanade | | |
| 2003 | RCPI/ Community/Sports Facilities Scheme (CSFS) | Design Singapore Council | | | |
| 2004 | | | The Arts House | | |
| 2005 | The Renaissance City Plan II (RCPII) | | New National Library Building /Drama Centre/ | Singapore Seasons, Singapore Arts Show | |
| 2006 | | | | Singapore Biennale | |
| 2007 | | Drama Centre | | | |
| 2008 | The Renaissance City Plan III (RCPIII) | | | | School of the Arts |
| 2009 | | | | | |
| 2010 | Framework for the Arts Spaces | | | | |
| 2011 | | | Goodman Arts Centre, Aliwal Arts Centre | | |
| 2012 | Report on Art and Culture Strategic Review | Ministry of Culture Community and Youth | Gillman Barracks | Art Reach | |
| 2013 | | | Closing of Telok Ayer Performing Arts Centre | | |
| 2014 | Master Plan | | | | |
| 2015 | | | National Gallery Singapore | | Culture Academy Singapore |
| 2017 | | | Drama Centre/ new Victoria Theatre and Concert Hall | | |
| 2018 | Our SG Arts Plan | | | | |

In parallel, Singapore has been internationally recognized as a leader in digital innovation. Since the launch of the *Smart Nation agenda* in 2014, the state has rolled out a nationwide broadband network, a digital twin of the island for planning purposes, and a range of participatory e-government platforms. In Singapore, 88.2% of the total population (5.16 million people) maintains active social media accounts, and 97% of social media use occurs on mobile devices, making the city-state one of the most digitally connected in the world. Smartphone ownership is also nearly universal, reaching 97% of households (Kemp 2025). This infrastructural density, data networks, sensor environments, and mobile-first habits create fertile ground for the study of hybridization.

The convergence of these two trajectories—cultural ambition and digital infrastructure—has produced what I call a "smart cultural nexus" (Richthofen and Tomarchio 2018), a network of people working at the infrastructure of technologies and creative fields.

Singapore is not presented here as a universal model. A state-led governance structure profoundly shapes its arts ecosystem, and its cultural scene has often been critiqued as a "golden cage" of subsidies and regulation. However, precisely because of this, the dynamics of Hybrid Art Space become more visible: cultural infrastructures are concentrated, digital adoption is near-total, and state strategies make the intersections of art, media, and urban planning unusually legible. In this sense, Singapore is best understood as a laboratory of hybridization. In this dense urban environment, the interplay between physical venues and online publics is evident, generating insights that resonate beyond the island itself.

Studying Singapore, then, is less about extracting a model to be emulated and more about working within this laboratory of hybridization to observe how Hybrid Art Spaces take shape. In the following sections, I introduce the methodological tools developed for this purpose: typologies that capture how

art venues manifest hybrid identities, and maps that trace the digital trajectories through which publics, places, and territories emerge. These instruments allow us to move from the broad contours of Singapore's smart cultural nexus to a fine-grained analysis of how hybrid art spaces are produced and circulated in practice.

## 5.3 Research Design

Singapore, as one of the world's most digitally connected urban environments, provides an ideal testing ground for investigating how art spaces circulate across both physical and networked publics. The city's dense institutional landscape, high smartphone penetration, and policy emphasis on digital innovation create conditions where spatial, social, and media infrastructures converge. This convergence makes Singapore not only an empirical case but also a model for understanding how hybrid cultural formations emerge within data-intensive urban regimes.

Building on this context, the empirical investigation adopts an approach grounded in cultural analytics (Manovich 2007; 2017), a methodological paradigm that applies computational and visual analysis to large-scale cultural data. Rather than treating social media as anecdotal evidence or informal audience feedback, this approach conceives it as a cultural dataset: a record of how institutions, publics, and platforms co-produce visibility, meaning, and value within hybrid media ecologies. In this sense, the analysis is not about measuring popularity or sentiment but about mapping the media representation of art places.

The study draws upon three complementary data streams and approaches that capture different dimensions of this interaction:

+ **Instagram**, the primary dataset, tracing how visitors photograph, tag, and share encounters with art and architecture. These images reveal recurring

intersections between art, people, and spatial settings, which are further analyzed through clustering and typological synthesis.

+ **Twitter** (in 2025 called X) – the secondary dataset, used to map textual and temporal traces of cultural discourse. This layer provides insight into the spatial and rhythmic dimensions of hybrid activity, showing how attention concentrates across venues and time.

+ **Synthetic visualizations**, including self-organizing maps (SOMs), hue-saturation mappings, and GIS-based cartographies. These combine computational and spatial analysis to transform heterogeneous data into comparative and interpretable visual structures. GIS mapping, in particular, grounds the otherwise abstract flows of digital attention in their urban coordinates, revealing where clusters of media activity overlap with physical infrastructures, cultural districts, and transport networks.

To ensure interpretive depth and empirical grounding, this computational framework was validated through qualitative inquiry. Interviews and focus groups with curators, planners, and cultural practitioners (n = 17) were conducted to evaluate whether the patterns identified through social media data resonated with professional experience (Tomarchio et al. 2020). These practitioners confirmed the analytical relevance of the visualizations and provided interpretive nuance regarding institutional priorities and audience behavior (Tomarchio et al. 2020). This triangulation between data-driven analysis and expert reflection strengthens the validity of the research design and grounds the concept of Hybrid Art Space within lived curatorial and spatial practice.

## 5.4 Instagram Data

The first dataset consists of Instagram images, which typically include photographs or short videos accompanied by captions, hashtags, and location metadata. Locations may be automatically embedded or added manually, offering a partial but valuable proxy for spatial reference.

Through this exploration of Instagram data, I developed what I call the **fundamentals of representation**—patterns linking the physical characteristics of venues to their media representation—and **typologies of Hybrid Art Spaces** that capture not only their spatial form but also their media identities. In architectural discourse, typology has long been used to describe recurring patterns of spatial organization (Moneo 1978). Here, I extend this approach into the digital domain: rather than focusing solely on the relations of rooms, façades, and functions, I investigate how venues acquire recognizable *types* through the images, hashtags, and posts that circulate them on social media. The objective is to provide curators, designers, and cultural planners with a framework for understanding how physical settings and digital practices co-constitute the identity of art spaces.

To translate these conceptual questions into empirical form, the study pursued four methodological objectives:

+ **Capture media identities**. Establish art venues as hybrid territories defined by both their built infrastructure and the social media traces that frame them.

+ **Relate content and aesthetics**. Examine not only what appears in images (art, people, architecture, practical items) but also their visual properties (color palette, saturation, luminosity, compositional style).

- **Identify recurrent patterns**. Use unsupervised clustering methods to reveal the fundamentals of representation—recurring pairings of content and aesthetics that underpin media identities.

- **Translate into typologies**. Develop heuristic categories that are not fixed, but that help practitioners and researchers reflect on how hybrid conditions shape cultural visibility and meaning.

The dataset consists of Instagram images tagged with five major Singaporean art venues—the ArtScience Museum, National Gallery Singapore, Asian Civilizations Museum, Center for Contemporary Art, and The Substation—complemented by a comparative city-wide sample of 61 additional venues. In total, over 3,000 images were collected via an API-based tool (4K Stogram), ensuring comparability across cases. For each of the five museums, a fixed number of 500 images was retrieved, representing variable time spans (from 20 days to four months) depending on their media activity. Only publicly available images were included; videos, stories, and user metadata were excluded to focus exclusively on the spatial and visual content of posts.

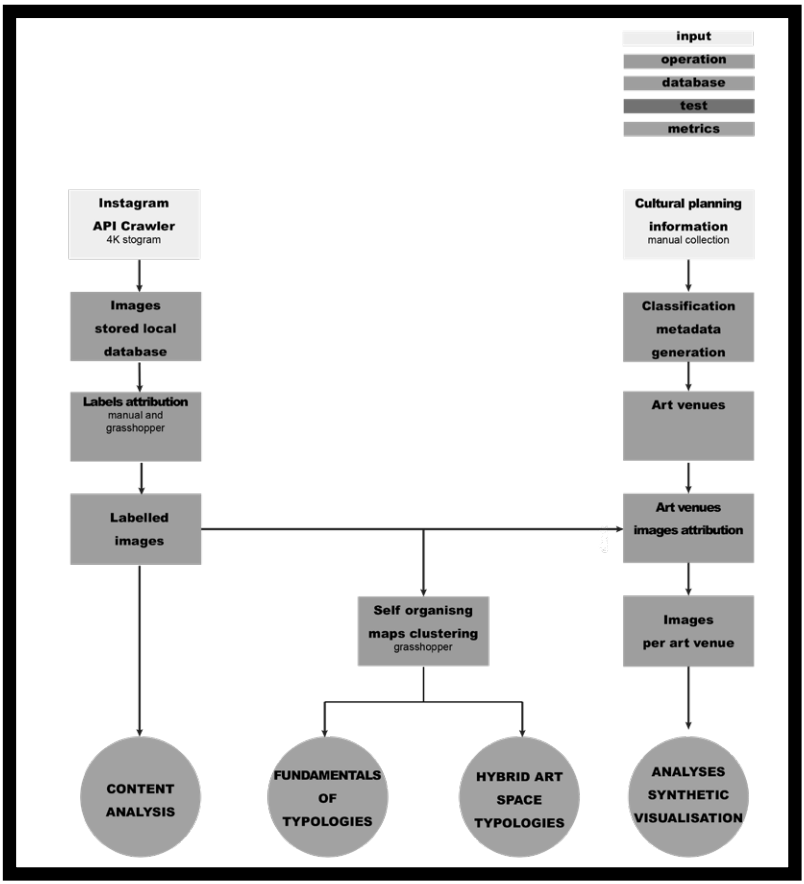


**Figure 6. Overview of the methodology, indicating data sources, primary operations, and results. Diagram by the author, originally published in Tomarchio (2021, 2023a).**

The analysis proceeded in four steps:

+ **Manual labeling of image content**. Each image was categorized into content types—Art, People, Architecture, and Practical Items—and their intersections (Art+People, Art+Architecture, etc.), distinguishing whether users emphasized artworks, social surroundings, or built environments.

+ **Automated extraction of visual properties**. Using Grasshopper within Rhino3D, I computed average color values (RGB), hue, saturation, and brightness for each image. These attributes enabled the analysis of the "visual language" of Instagram representations, following Manovich's notion of cultural analytics (Manovich 2020), in which compositional patterns and color palettes reflect systematic collective choices.

+ **Data clustering with Self-Organizing Maps** (SOMs). SOMs—an unsupervised neural-network algorithm—were used to combine content and aesthetic attributes into two-dimensional grids that visualize affinities among images. This method enabled qualitative interpretation of recurring visual grammars and the differentiation of media identities across venues.

+ **Typological synthesis**. The resulting clusters were read comparatively to construct typologies of Hybrid Art Spaces.

**Table 2. List of labels for image content. Tomarchio (2021, 2023a).**

| Art | Art+People | People | People + Architecture | Architecture | Practical Items | Arcchitecture + Art |
|---|---|---|---|---|---|---|
| painting/photography | people +paintings | selfie (front) | outdoor (landscape) + people | outdoor (landscape) | food | indoor (stairs, corridors, dome) + art |
| sculpture | people + books | selfie (back) | outdoor (building) + people | outdoor (building) | tickets | outdoor (stairs, corridors, dome) + art |
| books | people + sculpture | selfie (part of the body, e.g., feet) | indoor (stairs, corridors, dome) + people | indoor (stairs, corridors, dome) | retail | immersive art installations |
| screens | people + screens | 2 people or more | indoor (furniture) + people | indoor (furniture) | posters | |
| other art | people + traditional art | groups (posing or natural) | other people + arch | other arch | other practical items | |
| traditional art (jewels, artefacts, clothes) | people + light | groups (party) | | | | |
| light installation | performance + people | groups | | | | |
| performance (music, dance, theatre) | other art + people | other people | | | | |
| other art | | | | | | |

**Figure 7. Examples of pictures belonging to the category "Art". Tomarchio (2021, 2023a).**

**Figure 8. Examples of pictures belonging to the category "Art + People". Tomarchio (2021, 2023a).**

**Figure 9. Examples of pictures belonging to the category "People". Tomarchio (2021, 2023a).**

**Figure 10. Examples of pictures belonging to the category "Architecture + People". Tomarchio (2021, 2023a).**


**Figure 11. Examples of pictures belonging to the category "Architecture". Tomarchio (2021, 2023a).**


**Figure 12. Examples of pictures belonging to the category "Practical Items".Tomarchio (2021, 2023a).**

This multimodal methodology mirrors architectural practice: just as diagrams of building typologies offer designers a language for comparison and invention, **hybrid media typologies** function as heuristic tools for curators, planners, and scholars. They provide a framework for understanding how digital and physical configurations co-constitute institutional identity and for designing with, or against, the logics of visibility, participation, and algorithmic amplification.

## Ethical and Reproducibility Considerations

All data analyzed in this study are derived from publicly available Instagram posts retrieved via official API endpoints, in compliance with the platform's terms of service. No personal identifiers, usernames, or comment data were collected, stored, or analyzed. The focus remains strictly on visual content and metadata at the aggregate level, ensuring that individual users cannot be identified.

The workflow was designed for transparency and reproducibility. Each processing step—from data retrieval and manual labeling to feature extraction and SOM clustering—was documented through version-controlled scripts. Data normalization parameters, SOM grid topology, and iteration counts were standardized across all venues to allow comparative interpretation. While privacy restrictions prevent the redistribution of raw images, all derived datasets (metadata and feature matrices), Grasshopper definitions, and Python clustering scripts can be made available for scholarly replication upon request.

## 5.5 Twitter Data

The second methodological contribution of this study extends the empirical analysis of Hybrid Art Spaces to text-based social media (Twitter). While the Instagram analysis revealed how specific venues acquire distinctive media identities, the Twitter study investigates how those identities circulate and interact across the urban fabric. The goal is to make visible the spatial logics and temporal rhythms through which cultural activity, visibility, and hybridization emerge at the scale of the city. To pursue this goal, five methodological objectives guide the analysis:

+ **Spatialize media traces**. Translate text-based social data into spatial form, positioning art-related tweets in relation to specific venues, districts, and cultural infrastructures.

+ **Capture temporal rhythms**. Examine how media activity varies across days, weeks, and months, making visible both recurring routines and festival-driven peaks.

+ **Detect hybrid presences**. Identify sites that are not officially recognized as art venues but that attract significant cultural attention online, called emergent or informal cultural spaces.

+ **Explain amplification**. Analyze why specific venues generate disproportionately high levels of digital attention (Hyper Hybrid Art Spaces) by linking visibility to institutional, spatial, and affective characteristics.

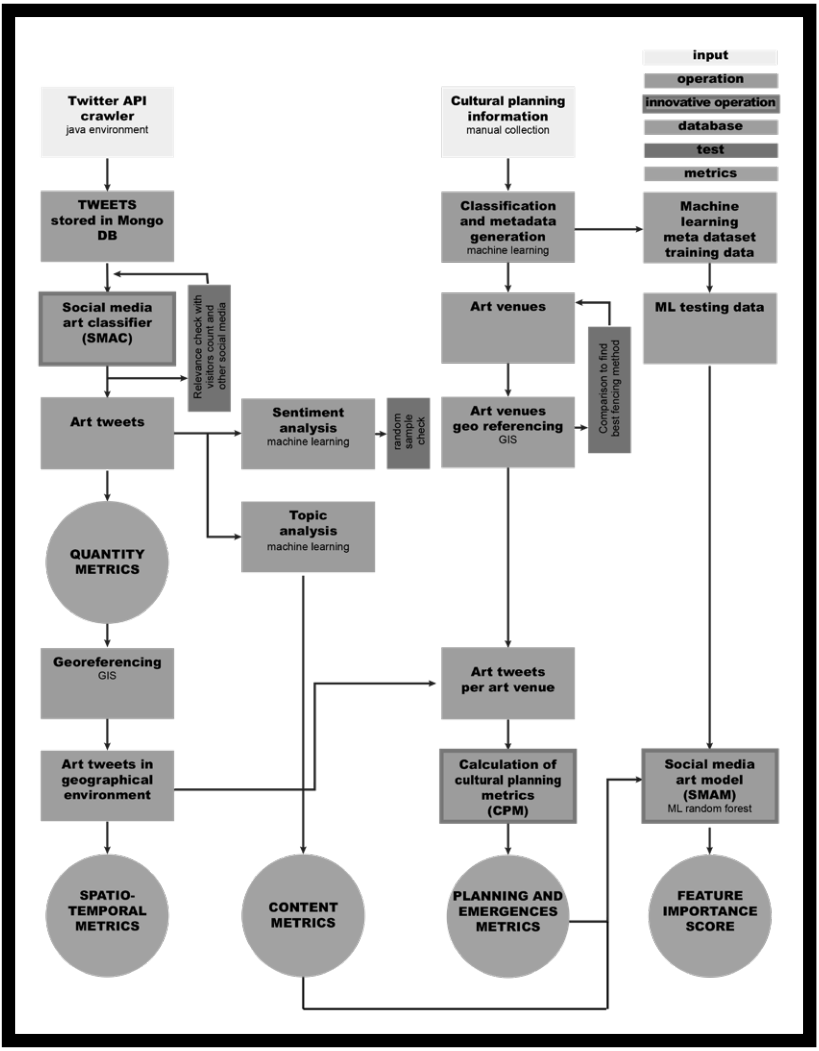


**Figure 13. This flowchart provides an overview of the steps of the methodology and lists its key innovations in terms of operations (purple boxes with a red stroke) and the five main results (orange circles). Diagram by the author, originally published in Tomarchio (2021, 2023b).**

**Dataset and Data Processing**

The dataset consists of 8,035,207 geolocated tweets collected from the Singapore metropolitan region between April 2016 and December 2017, retrieved through the official Twitter Streaming API.

To isolate art-related content, I developed a Social Media Art Classifier (SMAC) that combines keyword filtering with supervised machine learning.

- **Keyword filtering**. A vocabulary of 175 terms related to art, culture, and institutions (e.g., gallery, exhibition, performance, museum) was compiled from the National Arts Council (NAC) taxonomy, curatorial databases, and prior research on cultural analytics.

- **Machine-learning validation**. A Deep Neural Network (DNN) was trained on a manually annotated corpus of 8,000 tweets, achieving 92% classification accuracy in distinguishing art-related posts from general urban chatter.

After classification, the corpus contained 26,393 art-related tweets, which were further filtered for linguistic and spatial consistency. Duplicate posts, retweets, non-English messages, and automated accounts (identified through fixed coordinates or timestamps) were removed. Each tweet was stored in JSON format in a MongoDB database, retaining text, timestamp, geolocation, and engagement metadata (likes and retweets).

## Analytical Steps

+ **Geospatial mapping and venue attribution**: All tweets were imported into QGIS and spatially matched to a database of 165 cultural venues, compiled from NAC, the Urban Redevelopment Authority (URA) and Google Maps. Tweets located within a 20-meter polygon buffer of a venue were attributed to that venue. Unmatched tweets were clustered using kernel density estimation to detect emergent cultural sites, locations not officially recognized but exhibiting recurrent art-related activity.

+ **Venue attributes and planning metrics**: For each venue, eleven attributes were recorded: ownership (public/private), funding status, permanence (temporary/permanent), building type, accessibility, heritage value, clustering (number of venues within 200 m), visitor capacity, thematic focus, online activity rate, and visuality (photo frequency on Google/ Instagram). These variables formed the explanatory set for subsequent modeling.

+ **Quantitative classification.** Each venue was classified according to the relationship between its planning presence and social media activity:

+ *Confirmation*: officially planned venues exhibiting significant online activity.

+ *Negation*: officially planned venues with little or no visibility.

+ *Emergence*: unplanned or informal sites showing high and sustained activity. Thresholds were defined through nested mean classification: venues with tweet density above mean + 1σ were coded as "confirmations" and those above mean + 2σ as "hyper-hybrid.".

**Table 3. Attributes collected for each art venue, with possible values, description, and reference literature. Tomarchio (2021, 2023b).**

| Feature | Feature Description | Feature options | Feature variable |
|---|---|---|---|
| Type of process | The type of process taking place in the venue or space. It derives from Type of Venue, and aggregates different Type of Venue in macro-categories. | Mixed, Production, Consumption, Education | Categorical variable |
| Type of art | The main type of art featured in the venues. | All, Design, Theatre/Dance, Traditional Art, Visual Art | Categorical variable |
| Type of venue | The type of art venues | Art service, Gallery, Studio, Stage, Multipurpose, Museum, Organisation/Institution | Categorical variable |
| Permanent/Temporary | Indicates if the location is permanently dedicated to art, or if it becomes an art venue only for discrete spans of time (e.g., fairs) | Permanent Temporary | Categorical variable |
| Art venues within 500m | An indicator to gauge to what extent a venue is part of a cluster of venues (number of other venues within 500 m) | Count | Numerical variable |
| Heritage building | Indicates whether the art venues were hosted in a heritage building. | True / false | Boolean variable |
| Subsidy plan | Specifies either what plan offered by the National Arts Council or which the name of the board (if different from the National Arts Council, like the Urban Redevelopment Authority) supports the venues. | Arts Centre Scheme, Arts Housing Scheme, Arts for All grant, Community/Sports Facilities Scheme, Framework for Arts Spaces, NAC arts venues, other, none | Categorical variable |
| Spatial cluster | The art cluster it is part of cluster areas as defined and planned by Singapore planning department (URA). | Chinatown, Central Civic District, Gillman Barracks, Little India, Singapore River, Waterloo, none | Categorical variable |
| Outdoor/Indoor | Indicates whether the art venue is inside a building, or outdoor. | Outdoor, Indoor | Categorical variable |

+ **Temporal and discursive analysis.** Tweets were aggregated by hour, day, week, and month to construct temporal signatures for each venue and district, revealing both routine rhythms and festival-driven peaks.

+ **Sentiment analysis** (lexicon-based, -1 to +1) captured affective tone, while topic modeling using Latent Dirichlet Allocation (LDA) extracted five recurrent themes (events and openings, education, nightlife, institutional promotion, heritage).

+ **Topic diversity index** The entropy of topic proportions was used to derive a topic diversity index that quantifies discursive richness at each venue.

+ **Machine learning model**. To explain why some venues achieved exceptional visibility, a Random Forest classifier predicted confirmation, negation, and hyper-hybrid categories based on the eleven venue attributes. The model achieved 75.6% classification accuracy, highlighting accessibility, clustering, and visuality as the strongest predictors of amplification.

**Table 4. Features analyzed in the social media art model for each venue. Tomarchio (2021, 2023b).**

| Arte Venue Feature | Derived From |
|---|---|
| Topic Diversity | tweets (average value of the venue) |
| Sentiment Analysis | tweets (average value of the venue) |
| Art Venues within 500 m | derived from GIS map |
| Subsidy Plan | cultural planning information |
| Type of Venue | cultural planning information |
| Spatial Cluster | derived from GIS map + cultural planning information |
| Type of Art | cultural planning information |
| Type of Action | cultural planning information |
| Heritage Building | cultural planning information |
| Permanent/Temporary | cultural planning information |
| Indoor/Outdoor | derived from GIS map |

## Quantitative Classification and District Metrics

To assess how social media activity corresponds with cultural planning in Singapore, I developed quantitative metrics at two scales: **venue-level** and **district-level**, using the categorized dataset of art-related tweets.

**Venue-Level Metrics:** Confirmation, Negation, and Emergence. The distribution of tweets among art venues was highly skewed: 5% of venues generated approximately 68% of total art-related tweets. To normalize this imbalance, I applied a nested mean classification, defining four threshold categories of tweet count:

This yields four types of venue dynamics:

- *Negations:* officially planned venues showing little or no digital activity;
- *Confirmations*: venues where official recognition aligns with strong online visibility;
- *Emergences:* unlisted venues exhibiting high and sustained art-related activity;
- *Hyper-confirmations (Hyper-hybrids):* venues generating exceptionally high tweet-to-visitor ratios, up to 70× the baseline, indicating algorithmic amplification and feedback loops between physical attendance and digital visibility.

Formally, hyper-hybridity is defined when:

$$\text{Posts/Visitors} > \beta$$

β is the baseline proportionality coefficient derived from the mean relationship between visitor numbers and tweet volume.

**Table 5. Data classification, and thresholds of confirmations, negations, and emergences, with a count of elements for each class. Tomarchio (2021, 2023b).**

| From | To | Count | Classe name | Class name | Count |
|---|---|---|---|---|---|
| N of Tweets | N of Tweets | N of Venues | | | N of Venues |
| 1 | 24 | 102 | Negations | - | |
| 25 | 117 | 61 | Confirmation 1 | - | |
| 118 | 434 | 7 | Confirmation 2 | Emergence | 34 |
| 435 | 4340 | 41 | Confirmation 3 (Hyper) | Emergence | 1 |

**District-Level Metrics:** To evaluate hybrid cultural activity across Singapore's planning districts, I aggregated venue data to compute two district-level indicators:

- *Planning Confirmation (PC):* a measure of digital cultural planning success: PC=(C-N)/T. Where C and N represent the number of confirmations and negations in a district, and the total number of planned venues.
  The metric ranges from -1 (complete negation) to +1 (complete confirmation), indicating the share of officially listed venues that generate visible Twitter activity.

- *Emergence Intensity (EI)*: the relative importance of emergent sites: EI=E/A. Where E is the number of art-related tweets associated with emergent sites, and the total number of art-related tweets in the district.
  EI thus measures the extent to which spontaneous cultural activity contributes to a district's overall media visibility.

These metrics enable comparison of planned and emergent cultural geographies within a single analytical framework. At the district scale, the PC and EI indexes allow planners and researchers to identify where hybrid activity concentrates, stagnates, and where new territories of visibility arise beyond formal policy frameworks.

## Ethical and Reproducibility Considerations

All tweets used in this study were publicly accessible through the Twitter API and analyzed in compliance with the platform's terms of service. No usernames, profile data, or direct identifiers were stored or published. The dataset was aggregated at the venue level, ensuring that no individual user activity can be inferred.

The entire workflow—from data collection and cleaning to geospatial mapping, sentiment analysis, and model training—was implemented in Python (pandas, scikit-learn) and QGIS, with version-controlled notebooks ensuring reproducibility. Scripts for the Social Media Art Classifier (SMAC) and the Spatial Media Analysis Model (SMAM)are available for academic replication upon request.

## 5.6 Empirical Validation and Practitioner Perspectives

While the primary focus of this book lies on computational and visual analyses, the methodological framework was complemented by a qualitative validation phase conducted during the doctoral research. This section briefly summarizes the work to indicate how empirical findings were grounded in practitioners' perspectives, even though the detailed results are not discussed in this volume (Tomarchio et al. 2020).

The qualitative validation sought to assess whether the analytical categories and visualizations developed from social media data resonated with the lived experience of curators, artists, planners, and policymakers working in Singapore's cultural landscape. Two rounds of qualitative inquiry were conducted: (1) a focus group with six professionals representing major cultural institutions, and (2) a structured online survey with eleven additional participants across independent and governmental sectors. The participants were invited to evaluate visual maps and typological diagrams derived from the Instagram and Twitter analyses, and to comment on their accuracy, interpretability, and usefulness for understanding contemporary art spaces.

Across both phases, responses demonstrated a high degree of recognition of the phenomena identified through data analysis. The category of "Instagrammability," for instance, was recognized by curators as both an opportunity for accessibility

and a constraint that shapes exhibition design. Planners highlighted the potential of cultural mappings for cultural policy and city branding, while independent artists expressed ambivalence toward algorithmic visibility as a form of aesthetic and economic pressure.

These dialogues confirmed that the notion of Hybrid Art Space reflects the operational reality of contemporary institutions in Singapore. The triangulation between computational findings and practitioners' perspectives supports the interpretive validity of the analytical categories ("fundamentals of representation," "typologies," "hyper-hybrid venues") and underscores their relevance beyond data-driven reasoning.

## 5.7 Conclusion and Limitations

The methods outlined in this chapter employ a mixed-methods approach to analyze hybrid art spaces through digital traces. The analyses demonstrate that social media data, when carefully collected, labeled, and visualized, can reveal structural dynamics that are otherwise difficult to observe: how publics, institutions, and algorithms co-produce visibility in the urban cultural sphere. However, the empirical findings presented in this book are limited to Singapore, a city-state with a distinctive combination of digital penetration, centralized cultural governance, and dense institutional infrastructure. Therefore, while the results offer insights that are likely indicative of broader global tendencies in mediatized urban culture, they cannot be assumed to hold universally. A comparative analysis across multiple urban contexts would be required to test the generalizability of these patterns. Further methodological refinement could strengthen future research in three directions:

+ **Comparative scope:** Expanding the dataset to include other cities would allow identification of regional variations in hybrid logics and platform use.

+ **Temporal depth:** Longitudinal data could reveal how hybrid configurations evolve as algorithms, institutions, and public habits change over longer time scales.

+ **Integrated triangulation:** Future studies should combine computational mapping with ethnographic and curatorial inquiry to enable more symmetrical interpretations of hybrid practices.The present research design deliberately focuses on a single exemplary case to enhance analytical clarity. Singapore functions here as a laboratory of hybridity, where technological infrastructure, institutional experimentation, and social media saturation converge. The patterns observed should therefore be read as both specific to this context and suggestive of broader tendencies toward the algorithmic mediation of art, architecture, and public culture.

# Bibliography

Kemp, Simon. 2025. “Digital 2025: Global Overwiew Report.” https://datareportal.com/reports/.

Landry, Charles. 2006. The Creative City: A Toolkit for Urban Innovators. Reprinted. Comedia.

Manovich, Lev. 2020. Cultural Analytics. The MIT Press.

MITA, (Ministry of Information and the Arts). 2001. Renaissance City Report. https://www.nac.gov.sg/.

MITA, (Ministry of Information and the Arts). 2005. Renaissance City Report II. https://www.nac.gov.sg/.

Moneo, Rafael. 1978. “On Typology.” Oppositions 13.

National Art Council. 2008. Renaissance City Plan III- Art Development Plan. Singapore.

National Art Council. 2010. “Review of National Art Council’s Art Housing Scheme.” https://www.nac.gov.sg/.

National Art Council. 2012. The Report on Art and Culture Strategic Review. https://www.nac.gov.sg/.

National Art Council. 2020. Public Art Trust. https://www.publicarttrust.sg/Home.

National Library Board. 2014. URA Announces Its Conservation Master. In History SG. http://eresources.nlb.gov.sg/history/.

Richthofen, Aurel von, and Ludovica Tomarchio. 2018. Knowledge Map: Smart - Cultural City Singapore. [Object Object]. Application/pdf, 24 p. https://doi.org/10.3929/ETHZ-B-000280034.

Said, Nabilah. 2017. Arts Philanthropy yet to Take off Here, Say Arts Groups. In The Straits Time. http://www.straitstimes.com.

Tomarchio, L., Herthogs, P., & Tunçer, B. (2023a). Hybrid art space typologies in Singapore from social media data. City, Culture and Society, 34. ISSN: 1877-9166. https://doi.org/10.1016/j.ccs.2023.100519

Tomarchio, L., He, P., Herthogs, P., & Tunçer, B. (2023b). Assessing the impact of cultural planning in the age of social media: Twitter-based indicators for established and emerging art locations. International Journal on Smart and Sustainable Cities, 1. ISSN: 2972-4260.

Tomarchio, L. (2021). Hybrid Art Spaces: Exploring the Relationship between Social Media and Art Venues in Singapore. Singapore: Singapore University of Technology and Design. ISBN: 978-981-94-2506-8.

Tomarchio, Ludovica, Peijun He, Pieter Herthogs, and Bige Tuncer. 2020. "Cultural-Smart City: Establishing New Data-Informed Practices to Plan Culture in Cities." RE: Anthropocene, Design in the Age of Human (Chulalongkorn University, Bangkok, Thailand), 81–90. http://papers.cumincad.org/data/works/att/caadria2020_354.pdf.

Urban Redevelopment Authority. 1988. Master Plan for the Civic & Cultural District (Draft) Singapore. Urban Redevelopment Authority. https://eresources.nlb.gov.sg/printheritage/detail/.

Urban Redevelopment Authority. 1997. Museum Planning Area: Planning Report 1997. Singapore.