

When a Bridge Becomes Unfindable: Algorithmic Erasure, Vernacular Heritage, and Community Consciousness in Heshan's Gulao Water Town, China

Guangming Gao ^{1,*}, Yushan Li ², Xiaoxin He ², Yunfei Lin ², Musen Wang ¹

¹ School of Marxism, Wuyi University, Jiangmen 529020, China

² School of Humanities and Law, Wuyi University, Jiangmen 529020, China

* Correspondence:

Guangming Gao;

j002450@wyu.edu.cn

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Abstract

Digital heritage projects often assume that putting cultural materials online improves public access. The case of Heshan's Gulao Water Town complicates that assumption. Its stone slab bridges, once part of the everyday infrastructure of a water-based settlement, remain physically present and digitally traceable, yet they are difficult to encounter as heritage. Based on a theory-driven interpretive case study, this study combines a multi-platform visibility audit, official and tourism texts, local media narratives, field materials, and a supplementary survey of 221 respondents. It introduces algorithmic erasure to describe a condition in which vernacular heritage is not removed from digital platforms but becomes functionally unfindable through platform ranking, framing, query matching, and engagement-driven visibility. The audit identifies three mechanisms. First, thin presence: the Baidu Baike entry for Dian Tiandeng Bridge had only 386 total views at the time of audit. Second, framework misalignment: across major platform results, the bridges were mainly presented as scenery, tourism, or leisure content rather than as cultural heritage. Third, search pollution: searches for the specific name "Dian Tiandeng Bridge" returned large proportions of homonymous auction, entertainment, violent historical imagery, or unrelated content, with pollution rates of about 80% on Xiaohongshu and 68.4% on Douyin. On Douyin, polluted content attracted roughly 30.4 times more visible engagement than heritage-relevant content. Survey evidence further shows a gap between general support for heritage protection and concrete knowledge of the bridges. The study contributes to critical heritage studies and platform studies by conceptualising search pollution as a mechanism of heritage marginalisation and by showing that heritage protection in the platform age must include not only the preservation of stones and stories, but also the governance of the pathways through which people arrive at them.

Keywords: Algorithmic Erasure; Vernacular Heritage; Digital Findability; Platform Visibility; Search Pollution; Gulao Water Town; Stone Slab Bridges; Community Consciousness

1. Introduction

A bridge can remain standing while becoming difficult to find as heritage. In Heshan's Gulao Water Town, stone slab bridges once formed part of the everyday infrastructure of a water-based settlement. They connected villages, fishponds, waterways, market routes, kinship relations, and local memories. They were not built as monuments. They were built to make collective life possible.

Local historical accounts describe the evolution of Gulao's bridges from bamboo and timber crossings to more durable stone slab structures. This shift was shaped by the practical conditions of the water town: abundant waterways, limited local stone, and the need to move people and goods across a landscape organised by ponds, canals, and raised settlements (Heshan Municipal People's Government, 2025). Architectural and settlement studies of Gulao Water Town similarly show that its village form, agricultural space, ritual space, and mobility patterns were organised around the logic of water (Wei et al., 2021). A stone bridge in this setting is therefore more than an old object. It is a material device through which a water-based community organised movement, labour, settlement, and memory.

Among these bridges, Dian Tiandeng Bridge occupies a particularly dense place in local narration. Local and tourism accounts associate it with overseas Chinese philanthropy, communal labour, Lantern Festival ritual, and the technical difficulty of transporting stone into a water-rich landscape (Jiangmen Tourism, 2018). These accounts should be treated as heritage narratives rather than as fully verified archival facts. Their importance lies in what they make visible: the bridge is remembered not only as a crossing over water, but also as a trace of migration, return, public contribution, and attachment to the ancestral homeland. Local media have called Gulao's stone bridges the "skeleton" of the water town, a metaphor that captures their spatial role in holding together villages, ponds, waterways, and local aspiration (Nanfang Plus, 2020). The bridge is small in scale, but culturally dense.

The puzzle begins here. Dian Tiandeng Bridge has not disappeared from the landscape. Nor has it disappeared from the internet. It has a Baidu Baike entry, map traces, scattered WeChat public-account articles, travel notes on Xiaohongshu, short videos on Douyin, image-search results, and tourism-oriented descriptions of Gulao Water Town. Yet digital presence has not become heritage visibility. In our platform audit, the Baidu Baike entry for Dian Tiandeng Bridge had only 386 total views. Baidu search results for "Gulao stone slab bridge" were dominated by tourism and visual frames. On Xiaohongshu and Douyin, searches for the specific name "Dian Tiandeng Bridge" were heavily polluted by homonymous content related to auction practices, violent historical imagery, entertainment clips, commercial posts, and unrelated folk customs. On Douyin, polluted content attracted roughly 30.4 times more visible engagement than heritage-relevant content.

The user asks for the bridge. The platform returns the auction.

This is the condition named here as algorithmic erasure. The term does not refer to deletion, censorship, or the absence of digital records. It describes a subtler form of cultural marginalisation: heritage exists online, yet platform mechanisms of ranking, framing, query

matching, and engagement-driven visibility make it functionally difficult to find as heritage. The bridge is seen, but usually as scenery. It is indexed, but weakly encountered. It is searchable, but not reliably findable under its own name.

Existing scholarship helps explain parts of this problem, but not the whole of it. Critical heritage studies has shown that heritage is not simply inherited from the past; it is produced through regimes of recognition that often privilege monumental, expert-recognised, and institutionally authorised forms of heritage over local, everyday, and vernacular ones (Smith, 2006; Harrison, 2013). Platform studies has shown that search engines, recommendation systems, and content-ranking infrastructures do not merely host culture; they organise visibility, attention, and discoverability (Gillespie, 2018; Bucher, 2018; Noble, 2018; van Dijck et al., 2018). Scholarship on forging a sense of community for the Chinese nation has emphasised the role of shared historical consciousness, cultural symbols, and material carriers of memory in cultivating collective belonging (Qing & Xu, 2018). Each literature captures one side of the Gulao case. None fully explains how a local heritage object can be formally present, digitally recorded, and culturally meaningful, yet still fail to become findable in the platform environments where many users now encounter culture.

The gap is not merely empirical. It is conceptual. Heritage studies has paid close attention to recognition, but less to platform findability. Platform studies has analysed visibility and algorithmic power, but rarely at the scale of vernacular heritage. Research on community consciousness has shown why cultural heritage matters, but has tended to assume that heritage, once documented and narrated, can enter public circulation. The Gulao case challenges that assumption. A cultural symbol cannot contribute to shared memory simply because it exists. It must first become findable, intelligible, and available for attachment.

This study uses the stone-bridge heritage of Heshan's Gulao Water Town as a theory-driven interpretive case. The analysis draws on a multi-platform visibility audit, official and tourism texts, local media narratives, field materials, and a supplementary survey of 221 respondents. The survey supplies context rather than causality. The empirical core is the platform audit: it shows how the bridge's digital traces are made thin, misframed, or overwritten across the platforms through which users seek and encounter cultural information.

Three questions guide the analysis. First, how do platform infrastructures render Gulao's stone-bridge heritage visible, under-visible, or functionally unfindable? Second, through what mechanisms does algorithmic erasure operate in this case? Third, under what conditions can vernacular heritage become a digitally findable and narratively intelligible resource for community consciousness?

The contribution is threefold. First, the study extends critical heritage studies by moving the politics of heritage recognition into the platform domain. Vernacular heritage can be marginalised not only through formal exclusion from heritage lists or expert discourse, but also through ranking, framing, search pollution, and engagement metrics. Second, it identifies search pollution as a distinct mechanism of digital heritage marginalisation: a heritage identifier survives, but its referent is overwritten by more engaging homonymous content. Third, it develops a findability-

oriented approach to heritage protection. In the platform age, protecting a bridge means more than keeping its stones in place. It also means ensuring that the bridge can still be found as memory, heritage, and a possible resource for shared cultural life.

2. Literature Review: From Heritage Recognition to Digital Findability

2.1. Vernacular Heritage and the Politics of Recognition

Heritage is never simply the past preserved in the present. It is selected, named, framed, and made meaningful through social and institutional practice. Smith's concept of Authorised Heritage Discourse remains central here because it shows how expert-led and monument-centred heritage regimes often privilege grand, aesthetic, nationally legible, and institutionally recognised objects over ordinary and local forms of heritage (Smith, 2006). Harrison similarly treats heritage as an active process rather than a passive inheritance, shifting attention from what heritage is to what heritage does in contemporary social life (Harrison, 2013). Community heritage scholarship extends this critique by asking whose memories are authorised, whose attachments are marginalised, and what happens when official recognition fails to capture local meaning (Waterton & Watson, 2011). Winter's work on the politics of difference in heritage conservation further reminds us that apparently universal heritage vocabularies often carry uneven assumptions about value, scale, and legitimacy (Winter, 2014).

The Gulao stone bridges sit within this problem of recognition. They are neither monumental nor spectacular. Their cultural value lies in everyday use, water-town engineering, communal labour, and local narration. Such objects often become heritage late, weakly, or only locally, because their meanings are embedded in social practice rather than immediately visible as architectural grandeur. Place scholarship helps explain this embeddedness. Tuan's distinction between abstract space and meaningful place, Relph's concern with placelessness, and later studies of place attachment all show that ordinary settings can become identity-bearing through use, memory, affect, and repeated social encounter (Tuan, 1977; Relph, 1976; Lewicka, 2011; Scannell & Gifford, 2010). A small bridge may matter because people crossed it daily, met others there, remembered elders through it, or associated it with village routes and festival time. Its heritage value is relational before it is monumental.

This matters for research on cultural heritage and the sense of community for the Chinese nation. Qing and Xu conceptualise this sense of community through interrelated dimensions of cognition, value belief, and behavioural willingness (Qing & Xu, 2018). Recent Chinese scholarship has further argued that cultural relics and historical heritage can provide material carriers for shared historical consciousness and symbolic belonging (Wang & Wang, 2024; Ji & Lu, 2025). Yet this literature often assumes that cultural heritage, once recognised and narrated, can become available as a shared resource. The Gulao case puts pressure on that assumption. A bridge may carry local memory and overseas Chinese meaning, but those meanings cannot support broader cultural belonging unless people can first encounter the bridge, understand why it matters, and attach action to that understanding.

2.2. Digital Heritage and the Access Illusion

Digital heritage scholarship has long examined how technologies record, preserve, model, display, and communicate cultural materials. Early work on digital cultural heritage showed how digital tools could transform documentation, interpretation, museum experience, and public engagement (Cameron & Kenderdine, 2007). Economou's overview of heritage in the digital age is useful because it frames digital heritage as a two-way process: digital technologies change heritage management and interpretation, while broader heritage concerns shape how digital tools are adopted (Economou, 2015). Kenderdine's work on immersive heritage environments, such as digital interpretations of the Mogao Caves, demonstrates the capacity of digital media to produce powerful forms of mediated heritage experience (Kenderdine, 2013). More recent discussions of museums and digital identity also show that digital technologies reshape how institutions and publics encounter cultural objects, conflict, and belonging (Giannini & Bowen, 2023).

These studies make clear that digital heritage is more than technical reproduction. It is a cultural interface. The problem is that much digital heritage practice still carries an implicit promise: once heritage is digitised, access improves. The Gulao case shows why this promise is incomplete. A Baidu Baike page, a map label, a WeChat article, or a short video is a digital trace. It does not guarantee public encounter. Digitisation creates a trace. Findability creates a pathway.

The distinction can be stated more sharply. Digital presence is not the same as access; access is not the same as findability; findability is not the same as intelligibility. A bridge can be photographed, indexed, described, and uploaded while remaining difficult to locate through ordinary platform pathways. It can be visible in images but interpreted only as scenery. It can have an entry in a database but no stable route into public attention. This is the access illusion of digital heritage: the assumption that technical availability equals cultural availability.

For vernacular heritage, the access illusion is especially consequential. Monumental heritage has strong names, stable search identities, institutional links, and high public recognition. Small heritage often lacks all four. Its digital traces are more easily buried, misclassified, or overwritten. The challenge is therefore not only to digitise vernacular heritage, but to make it findable under the conditions through which people actually search, browse, watch, and share cultural information.

2.3. Platform Visibility and Algorithmic Erasure

Platform studies gives language to this problem of mediated visibility. Gillespie shows that platforms make consequential decisions about hosting, moderation, ranking, and circulation while often presenting themselves as neutral intermediaries (Gillespie, 2018). Bucher theorises algorithmic power as the capacity to shape what appears within a user's field of attention and what remains absent from it (Bucher, 2018). Noble demonstrates how search systems can reproduce social hierarchies through ranked visibility and misrepresentation (Noble, 2018). Van Dijck, Poell, and de Waal describe platforms as infrastructures that increasingly organise social and cultural life, not merely as tools used within it (van Dijck et al., 2018).

The relevance to heritage is direct. Platforms are now among the ordinary routes through which people meet cultural objects. Search engines rank them. Maps locate them. Short-video platforms

aestheticise them. Lifestyle platforms turn them into destinations. Public-account ecosystems narrate them. These systems do not formally decide whether a bridge is heritage, but they strongly influence whether the bridge can be encountered as heritage. Recognition and visibility have become separated. A local cultural relic may be formally recognised while remaining weakly ranked, weakly framed, and weakly discoverable.

Engagement-driven systems intensify the problem. Tufekci shows how networked platforms can amplify some forms of attention while leaving others structurally fragile (Tufekci, 2017). Zuboff's account of surveillance capitalism draws attention to the economic logics that privilege data extraction, behavioural prediction, and commercial optimisation (Zuboff, 2019). Napoli's work on social media and the public interest similarly raises the problem of whether platform systems designed around engagement can adequately serve public cultural value (Napoli, 2019). Vernacular heritage is not naturally favoured by such systems. It is often quiet, slow, local, and context-dependent. It rarely competes well with spectacle, consumption, controversy, entertainment, or commercial keywords.

Algorithmic erasure names the heritage-specific form of this problem. It works without deletion. It does not require a platform to remove a page or suppress a post. Instead, heritage becomes marginal through ordinary platform operations. Three mechanisms are especially relevant.

The first is thin presence. Heritage content exists, but at levels of visibility too weak to matter socially. A page is indexed; almost no one sees it. A video is uploaded; it receives little circulation. The trace exists, but the pathway is thin.

The second is framework misalignment. Heritage becomes visible, but under a frame that weakens its cultural meaning. A bridge appears as a scenic spot, leisure route, drone-shot background, or rural photography location. Users may see the object without being invited to understand its history, memory, or protection needs. The bridge is visible, but not as heritage.

The third is search pollution. A heritage name is overwritten by higher-engagement homonymous content. This mechanism differs from familiar accounts of filter bubbles or echo chambers, which concern the narrowing of exposure within personalised information environments. Search pollution occurs at the moment of active retrieval. A user enters a specific heritage name, but the platform returns a commercially or emotionally stronger referent attached to the same words. The heritage identifier survives; the heritage object disappears from the result field.

These mechanisms connect digital heritage to community consciousness. Heritage can support shared belonging only when it can circulate as a meaningful cultural reference. In the platform age, circulation depends not only on documentation or official recognition, but also on ranking, naming, framing, and search purity. The access illusion is the problem. Algorithmic erasure is the mechanism. Findability governance is the possible response.

3. Case, Materials, and Methodology

3.1. Case Rationale

The stone-bridge heritage of Heshan's Gulao Water Town is used here as a theory-building case rather than as a statistically representative case. Case study research is well suited to questions that ask how a phenomenon operates within a specific social and material setting (Yin, 2018). It is also useful when a case makes a broader mechanism unusually visible (Flyvbjerg, 2006). Gulao's stone bridges do precisely that. They are physically present, locally meaningful, digitally traceable, and yet weakly findable as heritage.

The case has four analytical advantages. First, the bridges are a clear example of vernacular heritage. Their value lies less in monumentality than in everyday infrastructure, water-town mobility, communal labour, and local memory. Second, Dian Tiandeng Bridge carries a local narrative that connects water-town engineering with overseas Chinese contribution, making it relevant to discussions of diaspora memory and shared cultural belonging. Third, the bridges have enough digital traces to support a visibility audit: they appear in search results, encyclopedia entries, map labels, public-account articles, lifestyle posts, short videos, and tourism materials. Fourth, the name "Dian Tiandeng Bridge" creates a distinctive search problem. The phrase "Dian Tiandeng" also carries other meanings in auction, entertainment, violent historical imagery, and folk contexts. This makes it possible to observe search pollution directly: a user searches for a bridge, but the platform may return a different, higher-engagement referent.

The case therefore allows a focused examination of a wider problem: how small heritage can survive physically and exist digitally while remaining difficult to encounter as heritage.

3.2. Materials

The analysis draws on four categories of material. The first and most important is a multi-platform visibility audit conducted on 24 June 2026. The audit records how Gulao stone-bridge heritage appeared across five digital access channels: Baidu Search, Baidu Baike, Sogou WeChat search for WeChat public-account content, Xiaohongshu, and Douyin. These access channels were selected because they represent common routes through which users in China search, read, map, browse, watch, and encounter cultural information.

The second category consists of official, tourism, and local media texts. Government materials provide information on Gulao bridge construction, water-town settlement, and local cultural history. Tourism and media materials show how the bridges are framed for public consumption. These materials help interpret the difference between heritage meaning and platform-visible framing.

The third category consists of field and project materials collected through the research team's local heritage work. These materials include site observations, photographs, student project records, and contextual notes on the physical condition and digital communication of the bridges. They are used to support interpretation, not to make independent ethnographic claims.

The fourth category is a supplementary questionnaire survey with 221 valid responses. The survey provides contextual evidence on respondents' knowledge of the bridges, support for

protection, willingness to participate, and acceptance of digital communication. It is not the evidentiary centre of the paper. Its role is to show the social side of the visibility problem: public support for heritage protection may coexist with limited concrete knowledge of the specific heritage object. The research team’s position shaped both access and responsibility. The lead author is affiliated with Wuyi University in Jiangmen, the prefecture-level city that administers Heshan, and the undergraduate innovation project that supported the survey and field materials was conducted by students from the same institution. This local embeddedness provided access to government materials, field observations, student documentation, and community-facing knowledge that would be harder for external researchers to obtain. It also requires reflexive caution: the critique offered here is not a detached judgment on a distant site, but a contribution from within the region whose vernacular heritage is at stake (Table 1).

Table 1. Empirical materials and analytical functions

Component	Empirical focus	Function in the analysis
Case object	Gulao stone bridges, especially Dian Tiandeng Bridge	Provides a vernacular heritage case in which physical survival and digital unfindability coexist
Official and local historical materials	Bridge construction, water-town ecology, local cultural memory	Establishes the heritage meanings attached to the bridges
Tourism and media texts	Travel routes, scenic descriptions, public-facing narratives	Shows how heritage is reframed as scenery, leisure, or rural charm
Platform visibility audit	Baidu Search, Baidu Baike, Sogou WeChat, Xiaohongshu, Douyin	Provides the core evidence for thin presence, framework misalignment, and search pollution
Field and project materials	Site observations, photographs, student documentation records	Supplies contextual understanding of the object and its communication setting
Supplementary survey	Awareness, support, participation willingness, digital acceptance	Contextualises the gap between general heritage goodwill and concrete cultural knowledge

3.3. Platform Visibility Audit

The platform audit follows the logic of digital methods by treating platform outputs as native digital objects rather than as neutral reflections of an external reality (Rogers, 2013). Search results, rankings, snippets, frames, view counts, and visible engagement metrics are themselves evidence of how platforms organise cultural visibility. The audit also draws from the broader tradition of algorithm auditing, but in a limited and transparent sense (Sandvig et al., 2014). It does not examine proprietary algorithms internally. It audits the user-facing outputs that ordinary users encounter.

Table 2. Platform visibility audit protocol and coding dimensions

Audit component	Operational decision	Analytical purpose
Audit date	24 June 2026	Provides a time-stamped snapshot of platform visibility
Access condition	Standard Chrome browser, unlogged-in search	Captures baseline entry-point findability
Access channels	Baidu Search, Baidu Baike, Sogou WeChat, Xiaohongshu, Douyin	Covers search, encyclopedia, public-account, lifestyle, and short-video environments
Search term 1	“古劳石板桥” / “Gulao stone slab bridge”	Tests general heritage visibility
Search term 2	“点天灯桥” / “Dian Tiandeng Bridge”	Tests specific-name findability and search pollution
Unit of analysis	Visible search result, platform entry, post, video, or summary item	Allows comparison across heterogeneous platform outputs
Presence	Whether relevant heritage content exists	Identifies digital traces
Richness	Depth and specificity of historical, cultural, or technical information	Distinguishes thin mention from substantive heritage interpretation
Accessibility	Visibility position in search or platform result environment	Assesses whether users are likely to encounter the content
Authority	Official, institutional, media, commercial, individual, or platform-generated source	Assesses credibility and source type
Heritage frame	Heritage protection, history/culture, tourism/scenery, navigation, entertainment, commercial, or other	Identifies framework misalignment
Search purity	Share of results referring to the bridge rather than homonymous or unrelated content	Identifies search pollution

Two search terms were used. The first was “Gulao stone slab bridge” (“古劳石板桥”), a descriptive term likely to be used by someone with general knowledge of the water-town bridges. The second was “Dian Tiandeng Bridge” (“点天灯桥”), the specific name of the focal bridge

(Table 2). The contrast between the two search terms is analytically important. The first tests general heritage visibility; the second tests whether a specific heritage name remains attached to its object or becomes polluted by homonymous content.

Searches were conducted in a standard Chrome browser under an unlogged-in condition. This setting captures baseline entry-point findability rather than personalised recommendation. It does not represent every user's possible result, but it is appropriate for asking what a casual or first-time user is likely to encounter before a platform has personalised the search environment.

Each result was coded along six dimensions: presence, richness, accessibility, authority, heritage frame, and search purity. Presence records whether relevant content exists. Richness records whether the content contains substantive historical, cultural, or technical information. Accessibility records whether heritage content appears in high-visibility positions. Authority records whether the source is official, institutional, commercial, or individual. Heritage frame records whether the bridge is presented as heritage, history, tourism, scenery, navigation, or other content. Search purity records the proportion of results that actually refer to the bridge rather than to homonymous or unrelated content .

A composite visibility score was calculated as a descriptive aid. It should be read as a heuristic summary, not as a precision measurement. Coding was conducted by the first author. A second coder independently coded a random 20% subsample. Simple percentage agreement exceeded 90% across the coding dimensions. Because agreement was not recalculated using chance-corrected coefficients, this reliability indicator is reported only as simple percentage agreement.

3.4. Analytical Strategy

The analysis moves from platform outputs to mechanisms. First, the audit identifies whether heritage content exists and how visible it is. This establishes the condition of thin presence. Second, the visible results are read for dominant frames. This identifies whether the bridges appear as heritage or as scenery, tourism, leisure, navigation, or unrelated content. Third, results for the specific name "Dian Tiandeng Bridge" are examined for homonymous displacement. This identifies search pollution.

Documentary and local materials then help interpret what is lost when the bridge is misframed or overwritten. Official and local narratives show the bridge's heritage meanings: water-town engineering, communal labour, overseas Chinese memory, and attachment to place. Tourism materials show how those meanings are often thinned into scenery. The supplementary survey adds a social context: many respondents support heritage protection and digital communication, but many also know little about the bridges themselves.

The design is interpretive. It does not reduce algorithmic erasure to a single metric, nor does it claim that platform visibility alone explains public awareness. The evidence instead traces a mediated condition: the bridge survives physically, exists digitally, and carries local meaning, yet platform pathways make it difficult to find and understand as heritage.

4. Findings: Algorithmic Erasure in Platform Visibility

The audit reveals a paradox rather than a simple absence. Gulao’s stone bridges appear across search, encyclopedia, public-account, lifestyle, and short-video environments. They have entries, posts, map traces, images, videos, and tourism descriptions. Yet these digital traces rarely lead users to the bridges as heritage. The bridge is present in the platform system, but it does not travel well through it (Table 3).

Table 3. Cross-platform visibility of Gulao stone-bridge heritage

Platform / search channel	Main empirical pattern	Dominant visibility problem	Overall interpretation
Baidu Baike: “Dian Tiandeng Bridge”	Dedicated entry exists; total views recorded at 386 at the time of audit; limited editing activity; no overview image	Thin presence	The bridge is indexed but weakly encountered
Baidu Search: “Gulao stone slab bridge”	First-page results dominated by tourism, images, routes, and general scenic information	Framework misalignment	The bridge is visible mainly as part of a water-town tourism landscape
Sogou WeChat search	Numerous public-account articles, many produced by official or semi-official accounts, but often framed around tourism, rural revitalisation, food, routes, or local promotion	Fragmented visibility	Content volume does not become coherent heritage visibility
Xiaohongshu: “Gulao stone slab bridge”	Notes mainly present the bridges as photography, leisure, travel experience, or scenic background	Framework misalignment	Lifestyle visibility weakens heritage interpretation
Xiaohongshu: “Dian Tiandeng Bridge”	About 80% of visible results polluted by homonymous auction, entertainment, violent historical imagery, folk, or unrelated content	Search pollution	The specific bridge name fails as a reliable search identifier
Douyin: “Gulao stone slab bridge”	First-page videos dominated by scenery, drone views, travel, and visual atmosphere	Framework misalignment	The bridge circulates as image more than as memory
Douyin: “Dian Tiandeng Bridge”	68.4% of visible results were polluted or unrelated; polluted content attracted roughly 30.4 times more visible engagement than heritage-relevant content	Search pollution	Engagement-driven ranking displaces the heritage referent

Source: Author’s platform visibility audit, 24 June 2026. Scores and engagement figures are descriptive indicators based on visible platform outputs rather than platform API data.

Three mechanisms explain this condition: thin presence, framework misalignment, and search pollution. Thin presence concerns low attention despite digital existence. Framework misalignment concerns visibility under the wrong cultural frame. Search pollution concerns the displacement of a heritage name by higher-engagement homonymous content. Together they show how heritage can be included in digital platforms while remaining functionally unfindable.

4.1. Thin Presence: Indexed But Weakly Encountered

The first mechanism is thin presence. The Baidu Baike entry for Dian Tiandeng Bridge demonstrates this condition clearly. The entry exists and contains basic information about location, bridge history, architectural form, and local narration. It gives the bridge a recognisable digital record. Yet at the time of audit, the entry had only 386 total views. It lacked an overview image and showed limited editing activity. The bridge had been entered into the digital encyclopedia, but the entry had not become a route into public attention.

Thin presence should not be mistaken for absence. Absence would mean that no page, post, entry, or trace exists. Thin presence is more ambiguous. The trace exists, but it remains socially weak. The page can be found by a user who already knows what to search for, yet few ordinary users are likely to encounter it without prior knowledge. This is why the condition matters for vernacular heritage. Small heritage often receives just enough documentation to appear digitally present, but not enough visibility to enter public cultural memory.

The same pattern appears beyond Baidu Baike. WeChat public-account materials are relatively abundant, but they are scattered across different accounts and frames. Many articles mention Gulao Water Town, local routes, food, rural revitalisation, or water-town scenery. Few build a sustained heritage interpretation of the bridges. Douyin also contains bridge-related videos, but most visible items receive limited interaction. The problem is not that no one has posted about the bridge. The problem is that these traces do not accumulate into a stable heritage presence.

Thin presence is therefore a failure of pathway rather than a failure of storage. The bridge has entered digital systems. It has not entered ordinary digital encounter.

4.2. Framework Misalignment: Visible as Scenery, Weak as Heritage

The second mechanism is framework misalignment. When the bridges become visible, they are usually framed as scenery, leisure, or tourism rather than as heritage. This pattern appears across search engines, lifestyle platforms, short-video platforms, and public-account materials.

On Baidu Search, first-page results for “Gulao stone slab bridge” were dominated by tourism and visual frames. The bridge appeared as part of a scenic water-town landscape: a place to visit, photograph, cycle through, or include in a local travel route. WeChat public-account materials were more abundant and sometimes more informative, but many still placed the bridges within tourism promotion, rural revitalisation, food experience, leisure itineraries, or local publicity. Xiaohongshu intensified the lifestyle frame. There, the bridge was usually a photo spot, a route marker, or a background for evaluating whether Gulao Water Town was worth visiting. Douyin pushed the visual frame even further. Videos foregrounded drone shots, water-town atmosphere, bridges over ponds, banyan trees, and picturesque movement across the landscape.

This visibility is not meaningless. Tourism and visual content can bring attention to a place that would otherwise remain outside public view. The problem lies in the frame. A bridge understood as a scenic object is not the same as a bridge understood as water-town infrastructure, communal labour, overseas Chinese memory, or cultural heritage. The object appears, but the meaning thins out.

Framework misalignment is especially consequential for vernacular heritage because its value depends on context. A monumental site may remain legible even when photographed quickly. A small bridge does not. Without interpretation, it can look like any other rural crossing. Its significance lies in the history of how stone was transported, how wood and brick were adapted to water-town conditions, how villages were connected, and how local accounts link the bridge to overseas Chinese contribution and festival memory. When platform frames privilege scenery and experience, these meanings are pushed to the margins.

The result is a familiar platform paradox: the bridge becomes more visible and less intelligible at the same time. It circulates as an image, but not as a memory object.

4.3. Search Pollution: When the Bridge Name is Overwritten

Search pollution is the sharpest form of algorithmic erasure because it occurs at the moment of active intention. The user is no longer passively browsing. The user enters the specific bridge name: “Dian Tiandeng Bridge.” Yet on Xiaohongshu and Douyin, many results do not refer to the bridge at all.

The reason lies in the phrase “Dian Tiandeng.” Beyond the bridge name, it also appears in other cultural and commercial contexts. It can refer to auction practices, violent historical imagery, entertainment plots, folk customs, jewellery marketing, and unrelated dramatic content. These meanings are more emotionally intense, commercially useful, or engagement-friendly than a local stone bridge. Platform search systems do not simply return the most culturally accurate referent. They return what their ranking and engagement systems make prominent.

On Xiaohongshu, about 80% of visible results for “Dian Tiandeng Bridge” were polluted by homonymous or unrelated content. On Douyin, 68.4% of visible results were polluted or unrelated. The interaction gap was more striking. In the Douyin results, polluted content attracted roughly 30.4 times more visible engagement than heritage-relevant content. A jewellery or auction-related item could easily outperform bridge-related content. A heritage user’s query was therefore absorbed into a different attention economy (Table4).

The user asks for the bridge. The platform returns the auction, and the auction receives far more attention.

The case of a bridge-focused Douyin creator is especially revealing. One post contained detailed information about the bridge’s length, surviving sections, construction technique, wooden pile foundations, brick piers, stone slabs, heritage designation, local donor narrative, original route, and stone source. In terms of heritage interpretation, it was among the richest materials in the audit. Yet it received only limited interaction. This contrast matters. The platform did not lack heritage knowledge. It failed to circulate the richest heritage knowledge at scale.

Search pollution therefore differs from simple low visibility. Thin presence means users are unlikely to encounter heritage content. Search pollution means users may fail to find heritage even when they intentionally search for it. The heritage identifier survives as a string of words. The heritage object is pushed out of the result field by more engaging meanings attached to the same words.

Table 4. Framework misalignment and search pollution in platform results

Mechanism	Platform evidence	What becomes visible	What becomes weak or displaced
Framework misalignment	Baidu, WeChat, Xiaohongshu, and Douyin results for “Gulao stone slab bridge”	Tourism routes, scenery, photography, leisure experience, rural charm	Bridge construction history, water-town mobility, communal labour, protection needs
Search pollution on Xiaohongshu	About 80% of visible results for “Dian Tiandeng Bridge” were homonymous or unrelated	Auction terminology, entertainment, violent historical imagery, folk or commercial content	The specific bridge as a heritage referent
Search pollution on Douyin	68.4% of visible results for “Dian Tiandeng Bridge” were polluted or unrelated; polluted content gained roughly 30.4 times more visible engagement than heritage content	Higher-engagement homonymous content	Heritage-relevant posts and videos
High-quality but low-visibility heritage content	A bridge-focused Douyin post contained detailed technical and historical information but received only limited interaction	Specialist heritage knowledge in marginal circulation	Broad public encounter and platform amplification
Algorithmic summary as related phenomenon	Douyin displayed an AI-generated summary of stone-bridge knowledge	Platform-produced heritage interpretation	Source transparency, authorship, correction, community participation

Source: Author’s platform visibility audit, 24 June 2026. Engagement figures are approximate and based on visible platform indicators such as views, likes, or comparable displayed metrics.

4.4. Narrative Consequences: When the Richest Meanings Circulate Least

Algorithmic erasure is not only a technical condition. It has narrative consequences. The audit and documentary materials reveal three narrative domains around Gulao’s stone bridges: official heritage narratives, tourism narratives, and local memory narratives. They differ in authority, richness, and visibility.

Official narratives provide the strongest basis for historical and cultural interpretation. Government materials describe the evolution of bridge construction, the water-town environment, the use of stone slabs and wooden piles, and the collective effort involved in building durable

crossings in a landscape shaped by water. These narratives make the bridges legible as vernacular infrastructure and local cultural heritage.

Tourism narratives provide the widest circulation. They make Gulao visible as a water-town destination, a scenic landscape, a rural leisure space, or a photography route. This form of circulation helps bring visitors and online attention. Yet it often detaches the bridge from the history that makes it meaningful. The bridge becomes a picturesque object.

Local memory narratives are the most culturally dense. They associate Dian Tiandeng Bridge with overseas Chinese contribution, communal labour, Lantern Festival naming, ancestral attachment, and the lived routes of villagers. These narratives should be treated with historical caution when they exceed documentary verification. Still, they explain why the bridge matters to people. They turn a stone structure into a memory object.

The central inversion is clear: the most visible narratives are not the richest ones. Tourism content circulates widely but carries limited heritage interpretation. Official accounts are credible but weakly circulated. Local memory carries depth but appears in scattered and low-visibility forms. Platform-generated summaries may briefly raise visibility, but they introduce a different problem: the platform becomes a heritage narrator without transparent sourcing, authorship, or community correction.

This inversion explains why digital presence is not enough. A bridge can be photographed many times and still remain culturally under-interpreted. It can have an encyclopedia entry and still fail to enter public attention. It can have local stories and still lose its name to auction content. What disappears is not always the object. More often, what disappears is the pathway from object to meaning.

The findings therefore refine the concept of algorithmic erasure. It is not a single act and not a single technical failure. It is an accumulation of weak pathways: low visibility, scenic framing, polluted search, and uneven narrative circulation. For Gulao's stone bridges, these pathways do not erase the stones. They weaken the bridge's capacity to become a shared cultural reference.

5. Supplementary Survey Evidence: Goodwill without Concrete Knowledge

The platform audit documents the supply side of visibility: what users are likely to encounter when they search, browse, or watch. The supplementary survey adds the public side of the problem. It shows a pattern that matters for interpretation: support for heritage protection is high, but concrete knowledge of the Gulao stone bridges remains weak.

Among the 221 valid respondents, 82 reported that they had never heard of the Gulao stone bridges, and 56 had only heard of them but knew little. Together, these two groups account for 62.4% of the sample. Only a small minority described themselves as relatively familiar or very familiar with the bridges. This does not mean respondents were indifferent to heritage. On the contrary, 91.9% supported or strongly supported strengthening the protection and use of the bridges. Positive attitudes toward digital heritage were also strong: 85.9% agreed or strongly agreed that digital protection and communication could help cultural transmission (Table 5).

Table 5. Supplementary survey evidence: awareness, support, and digital acceptance

Survey dimension	Key result	Interpretation for this study
Concrete knowledge of Gulao stone bridges	62.4% had never heard of the bridges or had only heard of them but knew little	Public knowledge remains thin even though the bridges are physically present and digitally traceable
Support for protection and use	91.9% were supportive or very supportive	Low awareness does not equal public indifference
Acceptance of digital heritage communication	85.9% agreed or strongly agreed with digital protection and communication	Digital repair has public acceptance, but acceptance alone does not create findability
Willingness to share through social media	57.9% selected social media dissemination as a possible participation form	Platform visibility affects not only knowledge but also participation pathways

Source: Author’s supplementary survey, 2024. N = 221.

The pattern is simple but important. Goodwill is not the same as knowledge. Many respondents support protection in principle, but do not possess enough concrete knowledge to name, locate, interpret, or explain the bridges. This gap helps clarify the social relevance of algorithmic erasure. If the public were hostile to heritage protection, the main problem would be indifference. If knowledge were already high, weak platform visibility would matter less. The Gulao case shows a different configuration: people are generally supportive, digital communication is acceptable, but the specific heritage object remains weakly known.

This configuration is consistent with the three mechanisms identified in the audit. Thin presence limits ordinary encounter. Framework misalignment makes the bridge visible mainly as scenery rather than heritage. Search pollution weakens even deliberate retrieval. Under these conditions, public support remains abstract. It attaches to “heritage protection” as a general value, but not necessarily to Gulao’s stone bridges as a concrete memory object.

The survey also points to a possible repair pathway. More than half of respondents selected social media dissemination as a form of participation. This matters because participation in small-scale heritage protection often begins with low-threshold actions: learning, sharing, visiting, photographing, volunteering, or joining community activities. Yet these actions depend on prior encounter. People cannot share what they cannot find. They cannot attach themselves to a bridge that appears only as a scenic background or disappears behind auction-related content.

For research on community consciousness, the implication is specific. Vernacular heritage does not become a cultural resource simply because it is old, local, or symbolically meaningful. It needs a chain of mediation: public encounter, narrative interpretation, and participatory attachment. The survey shows that the attitudinal ground is not empty. Respondents are broadly willing to support protection and accept digital communication. What remains weak is the bridge between general heritage goodwill and concrete cultural knowledge.

This is where digital findability becomes more than a technical issue. It becomes a condition for transforming supportive attitudes into situated awareness. Without findability, digital heritage communication risks staying at the level of scattered traces and general slogans. With findability, small heritage may become nameable, discussable, shareable, and actionable. The survey therefore strengthens the platform analysis without replacing it: algorithmic erasure matters because it interrupts the path from cultural value to public knowledge.

6. Discussion: From Digital Presence to Findability Governance

6.1. Algorithmic Erasure Without Deletion

The Gulao case points to a form of heritage marginalisation that is easy to miss because nothing has been removed. The bridge still stands. Its name appears online. A Baidu Baike entry exists. WeChat articles, map traces, Xiaohongshu notes, Douyin videos, and tourism descriptions all leave digital marks. Yet these traces do not reliably lead users to the bridge as heritage.

Deletion is easy to recognise. Algorithmic erasure is harder because the trace remains. The object is not excluded from the database; it is weakened in the pathways through which people encounter, interpret, and remember cultural objects. This makes algorithmic erasure different from the forms of exclusion most familiar to critical heritage studies. Smith's Authorised Heritage Discourse explains how expert-led and monument-centred systems privilege some forms of heritage over others (Smith, 2006). The Gulao case adds a second gatekeeping layer. Institutional recognition may place a bridge within a heritage category, but platform systems shape whether that recognised object is actually encountered.

This distinction matters for vernacular heritage. Monumental heritage often benefits from strong names, stable institutional links, mass recognition, and high search authority. Small heritage usually does not. It depends on more fragile pathways: a government page, a local story, a teacher's explanation, a visitor's post, a community archive, or a short video that happens to circulate. When those pathways are thin, misframed, or polluted, heritage may remain technically present but culturally unavailable.

Algorithmic erasure therefore describes marginalisation after digitisation. It does not deny the value of digital records. It shows why records are insufficient. A bridge can be indexed and still remain outside ordinary public encounter. It can be photographed and still be seen only as scenery. It can be named and still lose its name to a more engaging homonym. The access illusion of digital heritage begins precisely here: the belief that technical availability has solved the problem of cultural availability.

6.2. Search Pollution and the Failure of Active Retrieval

Among the three mechanisms identified in the audit, search pollution has the strongest theoretical significance. Thin presence explains weak attention. Framework misalignment explains shallow interpretation. Search pollution explains something sharper: the failure of active retrieval. The user already knows enough to search for the specific name. The platform still fails to return the heritage object reliably.

This mechanism differs from filter bubbles and echo chambers. Pariser's filter bubble describes the personalised filtering of information according to a user's inferred preferences (Pariser, 2011). Sunstein's echo chamber describes the narrowing of public exposure when people repeatedly encounter like-minded views and avoid difference (Sunstein, 2017). Both concepts concern the shaping of information environments around users. Search pollution operates at another moment. It does not begin from passive exposure or ideological similarity. It begins from a query.

The user types "Dian Tiandeng Bridge." The platform reads the phrase through its own ranking environment. Auction content, entertainment clips, violent historical imagery, and commercial posts attached to the same words perform better than the local bridge. The query is not unanswered; it is reinterpreted. The heritage identifier survives as language, but the heritage referent is displaced.

This makes search pollution more than noise. It is an algorithmic substitution of cultural meaning. For a local heritage object, a name is a fragile anchor. If the name no longer reliably returns the object, the heritage loses one of its basic routes into public knowledge. Search pollution therefore damages findability at the point where findability should be strongest: deliberate search.

The Gulao case is specific, but the mechanism is portable. Any small heritage site with a name that overlaps with commercial, sensational, entertainment, or politically charged meanings may face similar displacement. Search pollution is likely to be most severe when three conditions coincide: the heritage object has weak public recognition, the homonym has high engagement value, and the platform relies heavily on engagement signals to rank results. Dian Tiandeng Bridge meets all three conditions. A counterfactual clarifies the mechanism. Had the bridge circulated under a less collision-prone name, the search pollution documented here would probably be reduced. A name such as "Jinshan Lin Bridge," linked in local narratives to an overseas Chinese donor, would not carry the same auction, punishment, entertainment, or commercial associations observed in the audited results. The bridge might still remain a small and weakly known heritage object, but its name would be less vulnerable to being captured by a higher-engagement homonym. The erasure is therefore not a simple function of obscurity or low cultural value. It emerges from the collision between a fragile heritage identifier and a platform environment that rewards the more clickable referent.

6.3. From Survival to Attachment: a Findability Model

Heritage cannot contribute to shared memory simply by surviving. It must pass through mediating conditions that make it encounterable, understandable, and actionable. Anderson's account of imagined communities remains useful because it shows that collective belonging depends on shared symbols and media of circulation (Anderson, 1983). Assmann's work on cultural memory adds that memory requires durable carriers through which meaning can move beyond immediate interpersonal transmission (Assmann, 2011). In the platform age, such circulation and durability depend partly on digital findability.

The Gulao case suggests a five-stage model: physical survival, digital findability, narrative intelligibility, participatory attachment, and community-consciousness capacity. The stages are

not a linear guarantee. They are diagnostic conditions. A heritage object may fail at one stage, succeed partially at another, or move unevenly across them.

Table 6. Findability–Intelligibility–Attachment Model

Stage	Core condition	Gulao evidence	Main vulnerability
Physical survival	The object remains materially present	The stone bridges, including Dian Tiandeng Bridge, still exist in the water-town landscape	Physical survival does not ensure public knowledge
Digital findability	Users can locate the object through ordinary platform pathways	Baidu Baike entry, map traces, WeChat posts, Xiaohongshu notes, Douyin videos exist	Thin presence and search pollution weaken ordinary encounter
Narrative intelligibility	Users can understand why the object matters as heritage	Official and local narratives link the bridge to water-town engineering, communal labour, and overseas Chinese memory	Tourism and scenery frames detach the bridge from its cultural meaning
Participatory attachment	Users can act through learning, sharing, visiting, documenting, volunteering, or community interpretation	Survey respondents show support for protection and willingness to use social media dissemination	Support remains abstract if people cannot find or interpret the bridge
Community-consciousness capacity	Heritage can function as a micro-cultural resource for shared memory and belonging	The bridge links local history, overseas Chinese contribution, and water-town collective life	Capacity remains unrealised when findability and intelligibility are weak

The model clarifies where the Gulao case breaks down. Physical survival is not the problem. Basic digital documentation is not entirely absent. The main break occurs between digital trace and public pathway. The bridge exists online, but users do not reliably encounter it as heritage. A second break occurs at narrative intelligibility. When the bridge appears mainly as scenery, its memory function is weakened. A third break appears at participatory attachment. Respondents may support heritage protection, but support has limited force if the object remains vague, unnamed, or misframed.

This model also protects the argument from overstatement. A bridge does not automatically produce community consciousness. It becomes a possible resource only when people can find it, interpret it, and attach action to it. For vernacular heritage, these mediations are not secondary. They are the conditions under which cultural value becomes socially usable.

6.4. From Heritage Publicity to Findability Governance

The usual solution to low awareness is more publicity. The Gulao case shows why publicity alone is too weak a response. More posts may increase volume without improving search purity. More scenic videos may strengthen the tourism frame while further weakening heritage interpretation. More digital archives may preserve information without creating public pathways to it.

Findability governance begins from a different question: can a user who searches for a heritage object find it as heritage? For Dian Tiandeng Bridge, the first priority is search disambiguation. A query for the bridge should not be dominated by auction, entertainment, violent imagery, or unrelated content. This intervention is more urgent than producing additional generic publicity because it addresses the most direct failure identified in the audit: the collapse of the heritage name as a reliable search identifier.

A second priority is verified naming and cross-platform linkage. Government pages, encyclopedia entries, map labels, tourism materials, and short-video descriptions should use consistent names and link the bridge to reliable heritage information. A stable name is not a technical detail. For small heritage, it is the entry point into memory.

A third priority is heritage-oriented framing. Tourism visibility should not be rejected; it can bring visitors and attention. But scenic visibility needs interpretation. A bridge route, travel note, map label, or short video should connect the object to water-town engineering, communal labour, overseas Chinese memory, and protection needs. The aim is not to remove tourism, but to make tourism carry heritage meaning.

A fourth priority is support for local and youth-led documentation. The richest heritage knowledge may come from residents, local historians, teachers, students, and specialist creators. Yet the audit shows that high-quality heritage content can remain weakly circulated. Local documentation needs pathways into platform visibility: verified tags, institutional reposting, map integration, public-account linkage, and search-engine optimisation.

Findability governance does not mean making every local bridge viral. Virality is the wrong standard. The standard is reliable encounter. A user who searches for the bridge should find the bridge. A user who sees the bridge should understand why it matters. A user who values the bridge should have a way to learn, share, visit, document, or participate.

The broader implication reaches beyond Gulao. Vernacular heritage across many places faces a similar problem: it is meaningful because it is local, ordinary, and context-dependent, yet those same qualities make it weak in engagement-driven environments. The platform age has not ended the politics of heritage recognition. It has added another layer. Heritage protection now includes stones, stories, names, search results, frames, and pathways of encounter.

7. Conclusion

The case of Gulao's stone bridges shows how heritage can remain physically present, digitally traceable, and locally meaningful while becoming difficult to find as heritage. This condition has been described here as algorithmic erasure: a form of cultural marginalisation that operates not through deletion, but through weakened pathways of encounter. In the Gulao case, thin presence keeps heritage traces visible only at the margins; framework misalignment turns bridges into scenery, tourism, or leisure content; and search pollution displaces the specific bridge name with higher-engagement homonymous content. The survey evidence adds a public dimension: many respondents support heritage protection and accept digital communication, but concrete knowledge of the bridges remains limited. The problem is not simple indifference. It is the weak mediation between cultural value and public knowledge.

The wider implication is that vernacular heritage requires more than physical preservation and digital recording. It needs findable pathways, intelligible narratives, and opportunities for participation. This is especially true for local, ordinary, and context-dependent heritage, whose meanings are not immediately legible without explanation. A monumental site may carry strong symbolic recognition before a user searches for it. A small bridge usually does not. Its cultural value must be made encounterable.

The Findability–Intelligibility–Attachment model developed in this study offers a way to diagnose this process. Physical survival is the starting point, not the endpoint. Digital findability allows users to locate the object. Narrative intelligibility allows them to understand why it matters. Participatory attachment allows them to learn, share, visit, document, or protect it. Only through these mediations can vernacular heritage become a possible resource for shared memory and community consciousness.

The study has limits. The platform audit captures a time-stamped visibility condition rather than a permanent state. Platform results may change with time, location, login status, and recommendation history. The survey provides contextual evidence, not causal proof. Local narratives around Dian Tiandeng Bridge also require further archival and oral-historical work. Future research could compare multiple vernacular heritage sites, track platform visibility over time, examine personalised search conditions, or study how local communities and platforms might collaborate on heritage findability.

Even with these limits, the Gulao case makes one point clear. In the platform age, heritage can be erased without being deleted. A bridge may stand, be photographed, and appear online, yet still fail to enter public memory as heritage. Protection therefore cannot end with stone repair, official designation, or digital upload. It must also include the name, the frame, the search pathway, and the narrative route through which people arrive at meaning. A bridge may stand, be photographed, and appear online, yet still fail to enter public memory as heritage. Protection therefore cannot end with stone repair, official designation, or digital upload. It must also include the name, the frame, the search pathway, and the narrative route through which people arrive at meaning. A bridge that survives only as a digital record is a ghost of material heritage; a bridge that stands but

cannot be found is a ghost of public memory. A bridge is not protected only when it remains standing. It is protected when it can still be found as heritage.

Author Contributions:

Conceptualization, research design, and writing—original draft, Guangming Gao; methodology, theoretical framing, and manuscript revision, Guangming Gao; questionnaire distribution, field visits, data collection, and preliminary material organization, Yushan Li, Xiaoxin He, and Yunfei Lin; writing—review and editing, Guangming Gao and Musen Wang; supervision and academic guidance, Guangming Gao and Musen Wang. Guangming Gao served as the first author and corresponding author. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement:

This study involved no biomedical intervention, clinical procedure, or collection of sensitive personal information. The platform visibility audit was based on publicly accessible online information and focused on search results, platform framing, content visibility, and heritage representation rather than individual users. The supplementary questionnaire survey was conducted on a voluntary basis. Respondents were informed of the academic purpose of the study before participation, and no personally identifiable information was collected. All questionnaire data were analysed and reported in aggregate form.

Field observations, photographs, student project records, and contextual notes were used only for academic interpretation of the case. The authors took care not to disclose private information

about individuals, local residents, students, or online users. The study was conducted by a research team affiliated with Wuyi University and posed minimal risk to participants and communities.

Informed Consent Statement:

The supplementary questionnaire survey was conducted on a voluntary basis. All respondents were informed of the academic purpose of the study before participation, and their submission of the completed questionnaire was regarded as informed consent to participate. No personally identifiable information was collected. All responses were anonymised, analysed in aggregate form, and used only for the purposes of this study.

Data Availability Statement:

No new data were created or analyzed in this study. Data sharing is not applicable to this article.

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References

- Anderson, B. (1983). *Imagined communities: Reflections on the origin and spread of nationalism*. Verso.
- Assmann, J. (2011). *Cultural memory and early civilization: Writing, remembrance, and political imagination*. Cambridge University Press.
- Bucher, T. (2018). *If... then: Algorithmic power and politics*. Oxford University Press.
- Cameron, F., & Kenderdine, S. (Eds.). (2007). *Theorizing digital cultural heritage: A critical discourse*. MIT Press.
- Economou, M. (2015). Heritage in the digital age. In W. Logan, M. Nic Craith, & U. Kockel (Eds.), *A companion to heritage studies* (pp. 215–228). Wiley-Blackwell.
<https://doi.org/10.1002/9781118486634.ch15>
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2), 219–245. <https://doi.org/10.1177/1077800405284363>
- Giannini, T., & Bowen, J. P. (2023). Global cultural conflict and digital identity: Transforming museums. *Heritage*, 6(2), 1986–2005. <https://doi.org/10.3390/heritage6020107>
- Gillespie, T. (2018). *Custodians of the internet: Platforms, content moderation, and the hidden decisions that shape social media*. Yale University Press.
- Harrison, R. (2013). *Heritage: Critical approaches*. Routledge.
- Heshan Municipal People's Government, Gulao Town. (2025, March 21). *Memories of Gulao: Bridge construction*. Heshan Municipal People's Government.

- https://www.heshan.gov.cn/jmhsglz/gkmlpt/content/3/3266/post_3266502.html. Accessed 25 June 2026. (In Chinese)
- Ji, H., & Lu, Y. (2025). Triple “reproduction”: The internal mechanisms through which historical cultural heritage forges a sense of community for the Chinese nation. *Ethno-National Studies*, 2025(1), 13–27. (In Chinese)
- Jiangmen Tourism. (2018, January 2). One of the most beautiful stone slab bridges in Heshan’s Gulao Water Town: The legend of Dian Tiandeng Bridge. Sohu. https://www.sohu.com/a/214242991_695709. Accessed 25 June 2026. (In Chinese)
- Kenderdine, S. (2013). “Pure Land”: Inhabiting the Mogao Caves at Dunhuang. *Curator: The Museum Journal*, 56(2), 199–218.
- Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology*, 31(3), 207–230.
- Nanfang Plus. (2020, December 4). Starting from Jiangmen Iron Bridge: Jiangmen has many bridge stories. Nanfang Plus. <https://pc.nfnews.com/78/4387121.html>. Accessed 25 June 2026. (In Chinese)
- Napoli, P. M. (2019). *Social media and the public interest: Media regulation in the disinformation age*. Columbia University Press.
- Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism*. New York University Press.
- Pariser, E. (2011). *The filter bubble: What the Internet is hiding from you*. Penguin Press.
- Qing, J., & Xu, X. (2018). The sense of community for the Chinese nation: Conceptual connotation, elemental analysis and practical logic. *Ethno-National Studies*, 2018(6), 1–14+123. (In Chinese)
- Relph, E. (1976). *Place and placelessness*. Pion.
- Rogers, R. (2013). *Digital methods*. MIT Press.
- Sandvig, C., Hamilton, K., Karahalios, K., & Langbort, C. (2014). Auditing algorithms: Research methods for detecting discrimination on internet platforms. Paper presented at the Data and Discrimination: Converting Critical Concerns into Productive Inquiry Preconference, 64th Annual Meeting of the International Communication Association, Seattle, WA, United States.
- Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology*, 30(1), 1–10.
- Smith, L. (2006). *Uses of heritage*. Routledge.
- Sunstein, C. R. (2017). *#Republic: Divided democracy in the age of social media*. Princeton University Press.
- Tuan, Y. F. (1977). *Space and place: The perspective of experience*. University of Minnesota Press.
- Tufekci, Z. (2017). *Twitter and tear gas: The power and fragility of networked protest*. Yale University Press.
- van Dijck, J., Poell, T., & de Waal, M. (2018). *The platform society: Public values in a connective world*. Oxford University Press.

- Wang, Y., & Wang, Q. (2024). Giving full play to the role of cultural relics and cultural heritage in forging a sense of community for the Chinese nation. *Folklore Studies*, 2024(5), 5–15+157. (In Chinese)
- Waterton, E., & Watson, S. (Eds.). (2011). *Heritage and community engagement: Collaboration or contestation?* Routledge.
- Wei, C., Zhong, Z., & Liao, H. (2021). The last waterfront in Pearl River Delta: Space generation and cultural ecological characteristics of traditional village in Gulao Waterfront. *South Architecture*, 2021(4), 97–104. <https://doi.org/10.3969/j.issn.1000-0232.2021.04.097>. (In Chinese)
- Winter, T. (2014). Beyond Eurocentrism? Heritage conservation and the politics of difference. *International Journal of Heritage Studies*, 20(2), 123–137.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE.
- Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs.

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