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Research Article

"Preserving Heritage, Ensuring Legacy: Research and Optimization Proposals for the Management Mechanisms and Systems of Macao's Cultural Heritage"

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ABSTRACT

This research seeks to enhance the preservation and management of Macao's rich cultural heritage by proposing innovative mechanisms and systems. Focused on optimizing current practices, the study employs a multi-faceted approach, combining archival research, stakeholder interviews, and comparative analyses of international best practices. The primary objectives of this research include the identification of key challenges in cultural heritage management in Macao, an evaluation of the effectiveness of existing systems, and the formulation of practical optimization proposals. Key areas of investigation encompass adaptive conservation strategies, community engagement, technological integration for documentation and monitoring, and sustainable tourism practices. By offering comprehensive optimization proposals, this research aims to provide actionable insights for policymakers, cultural institutions, and community stakeholders involved in the management of Macao's cultural heritage. The goal is to foster a holistic and sustainable approach that balances heritage conservation with community involvement, ensuring that Macao's unique cultural legacy continues to thrive in the face of evolving challenges and opportunities. The findings and recommendations of this research contribute to the broader discourse on cultural heritage management and offer a valuable blueprint for preserving the cultural richness of Macao for future generations.

Keywords: cultural interest analysis, Macau, heritage, legacy preservation, data optimization, machine learning model

1. Introduction:

From the second curios acquired from the past come to be intentionally secured in order to address social practices and coherence inside change, the issue of preserving legacy has been outlined by interrelated sets of values. In cutting edge period, academic writing has differently pondered on how significance of legacy in city is grounded in assorted parts of significant worth - as verifiable, usufructory and educational heritage, as helpful for metropolitan person, place character and social attachment, as political influence or financial and the travel industry asset [1]. One begins to understand heritage as a "value-loaded concept" that is susceptible to multidimensional contestation when considering values as extrinsic to physical entities, ultimately ascribed by people, therefore multifaceted. Thusly, famous predisposition for the "natural" esteem in "pastness" of legacy should be visible as just privileging one perspective - nostalgic drive deploring unalterable misfortune (Lowenthal 1985: xvii). As built credits subject to consistent amendments that reflect evolving socio-social settings, values as a matter of fact saturate all parts of preservation: 1) legacy definition and recognizable proof, 2) reasonings and purposes, 3) for whom is legacy preserved, 4) fitting techniques for its upkeep, understanding and powerful administration. Essential to subject of significant worth is problem of scale, by which various sizes of legacy (neighborhood, provincial, public, worldwide) bring into play divergent qualities and concerns [2].

By permitting correlation, esteem in its various faculties has become fundamental to legacy the executives of memorable urban communities. The amount and degree of conservation is determined by a sort of "social calculus" that assesses both principles and utility, material and symbolic dimensions, as well as both situations (conditions) and processes (practices) of urban culture. Laying out the moving mentalities and settings of significant worth development, adjusting which values to recover or dispose of, and deciding preservation activities, comprise periods of a non-straight cycle which include frequently extraordinary dealings between partners. Eventually, to the extent that monitoring metropolitan legacy is bound up with challenging qualities and their combination towards shielding what is seen as usually esteemed metropolitan asset, it is now ensnared in the dynamic cycle in arranging and improvement of the constructed climate.
On account of Macau, the premium in describing its direction in metropolitan protection inside the hypothetical structure illustrated above is triple. To begin with, to survey how well it adjusts to the average legacy versus-improvement model found somewhere else, in which endeavors in rescuing legacy are frequently subsequent to quick metropolitan development, and by which results are adapted by agreement looking for activities and socio-political entanglements of the time. Second, to report the particular blend of drawn out Portuguese presence, prevailing financial impacts like betting and related foundation improvements, and recently 1999 handover and World Legacy status which together present an interestingly complicated situation for metropolitan preservation [3]. Third, the powerful cycle by which various qualities rule and retreat, impact and accommodate, in mix with the two past variables and comparable to progressive authentic minutes as well as spatial sizes of concern, is analyzed to find developing predispositions and balances, accords and cacophonies, achievements as well as logical inconsistencies in moderating Macau's legacy [4].

The Historic Centre of Macau

In 2005, Noteworthy Focus of Macau is effectively recorded on World Legacy Rundown as showing a novel declaration of social congruity between East and West, which are featured on its OUV. There are 22 buildings and 8 plazas on the site, which are broken down into four main categories: Chinese Sanctuaries (3 structures altogether), Western Places of worship (7 structures altogether), Homes (3 structures altogether) and Others (9 structures altogether). The buffer zones that surround them are regarded as an essential component of Historic Centre of Macau as well as have same significance as the designated buildings. The whole site demonstrates the veracity of the concurrence of Chinese and Portuguese societies in Macau, uncovering genuine personality of Macau and showing the accomplishment of a 400-drawn out Eastern and Western social trade. All the more significantly, the Memorable Focal point of Macau isn't 'legacy' in the overall impression of old, excellent and brilliant engineering worked previously. It catches the past, carrying it into the current where it turns into a significant piece of the public activity and social legacy of the local area in Macau today. In addition, the transformation of Chinese plans in western engineering as well as the other way around are the amazing proof of the effective and significant trade of human qualities [5].

Interpreting intangible cultural heritage in Macau from a ‘Macanese’ perspective

Understanding the identity and role of the minority "Macanese" culture in the development of colonial Macau is the only way to interpret much of the Portuguese legacy's intangible culture, such as colonial and postcolonial literature. Untouchables could expect that the term 'Macanese' alludes to individuals of Macau all in all, which isn't true. Understanding the "Macanese" minority's creole and patois language is essential to understanding this cultural phenomenon. After some time, Portuguese and Macanese specialists have offered confounding understandings of the starting points of the 'Macanese', 'Macaense', 'Macaísta'. Bento da França identified the "Macaense" as having Portuguese, Malay, and Indian characteristics in 1897. Nonetheless, Eduardo Brazão (1957) contended that it was interesting for the 'Macanese' to be of Indian plunge. According to lvaro de Mello Machado (1913), "Macanese" were children of marriages with women from Japan and China as well as Malacca; asserting that posterity distinctively show more proof of Malay family line than Chinese [6]. Carlos Estorinho (1962) disproves the idea of Chinese miscegenation. Despite this, Manuel Teixeira (1965), citing local documents and records, refutes Estorinho's claim. According to Teixeira's concept, the "Macaense" were the descendants of Portuguese males who had interracial relationships with local Chinese and were brought into the world in Macau. At that time, he distinguishes between the Chinese and the "Macanese" in these relationships: The first was born with a Portuguese name and underwent baptism; the second became a Christian and received his education in Portuguese. According to Morbey (1994:200), Luso-Chinese Christians with either Euro-Indian or possibly Euro-Malay ancestry may have been the first 'Macanese Eurasian' people. More recently, Cabral (2002:39–40) has defined the criteria for the "Macanese Eurasian": individuals who, first and foremost, brought an organic miscegenation with Portuguese roots to Macau; second, the adoption of a Catholic faith; and third, the possession of Portuguese-based Creole, which is derived from a Malaccan model. According to Cabral, those who fit these criteria are eligible to be referred to be "Macanese." Teaching the people living in the area under the control of the Portuguese organisation and improving the capacities of Macau's public authorities were fundamental tasks for the public authority at the turn of the 20th century. It was agreed that learning Portuguese was the best path forward. Standard Portuguese knowledge advanced and the number of Portuguese language schools began to rise. As a result, "Lingu Maquista," which was spoken mostly in the local area, had started to gradually lose its cultural

significance. This led to the development of a diglossic model that contrasted normal Portuguese with the "High" variation, which had a higher social status and was spoken in appropriate contexts such as the workplace, school, and with other Portuguese speakers. Contrarily, Maquista was the "Low" version that was employed in informal social gatherings with loved ones. Maquista's decreolization was'redesigned' over time to conform to standard Portuguese [7]. Youngsters were rebuffed on the off chance that they were found involving the creole in the instructive space. The Macanese creole may possibly proceed on the off chance that there is an enormous number of speakers locally. This was the situation in the branch-off local area in Hong Kong where the shortfall of the restorative impact of standard Portuguese permitted the creole to endure even until the present time. It is spoken by a tiny number of Macanese Eurasians who can be tracked down in homes for the matured. Even though there are no records of the number of creole speakers in Macau, the language can still be heard in the following settings: Macanese Old stories, Music, Sonnets and Culinary Recipes and other Strict and Conventional Macanese settings [8]. After the power of Macau was formally gotten back to the Chinese Government on the twentieth of December, 1999, further changes started to happen to the social personality of Macau and the structure of dialects, and their assortments, that have convoluted the idea of talk and the course of intercultural correspondence inside the domain. Exploring Macanese character in Macau today is difficult. Information pertaining to their numbers has not been made available to the general public by Department of Census as well as Statistics. The evaluation kept in 2001 assessed quantity of Eurasians living in Macau to be in area of roughly 4,000 300. In a similar vein, it is challenging to locate data regarding the various ethnic or mixed-race groups that make up the cultural identity of Macau. In spite of the fact that they are in the minority, their commitment to Macau society, its way of life, and economy ought to be considered carefully by most of the populace, nor disregarded by researchers looking to address misinterpretations concerning their special sociocultural impacts during 400 years of settlement [9]. Tragically there is an absence of an interdisciplinary point of view on the meaning of the beginnings of the local area that is Macau today, and an absence of drive for making data open to the worldwide examination local area. For researchers from a variety of disciplines, the linguistic heritage of Macau is an intriguing field of study: including discourse analysis and intercultural communication, two relatively new fields, in the context of language development and loss. Today, as far as language shift and codes, there may as of now not be a Portuguese-talking climate among the more youthful age Macanese Eurasians. Numerous Macanese youngsters are most likely more capable clients of Cantonese and may feel hesitant to talk in Portuguese. They might also show a strong preference for Mandarin and English. 10]

Mutually Beneficial Developmental Mode: Long-Standing Policy Guidance of Macau

Taking into account improvement of verifiable blocks, it isn't sufficient to just safeguard the authentic blocks, however have the option to exploit the authentic and social assets of blocks successfully, creating arising business frames, and shaping an improvement model of social, the travel industry and business helpful turn of events. The commonly gainful formative method of Macau is without a doubt commendable for reference. Macau has numerous cultural relics, buildings, and ruins with outstanding historical, archaeological, aesthetic, scientific, anthropological, and artistic values due to its unique historical status. Since the effective designation as a World Legacy Site of Macau, an ever increasing number of individuals have started to focus on its social legacy, and Macau has progressively shaped a travel industry picture addressed by social legacy. The memorable focal point of Macau saves the authentic embodiment of Macau's numerous long periods of social trades among China and the West, and is the most seasoned, biggest, most complete and most focused verifiable metropolitan region in China with Western-style structures and Chinese and Western-style structures mirroring one another, and is a significant authentic observer of the spread of Western strict culture in China as well as Far East, crystallization of the reciprocal and enhanced concurrence of Chinese as well as Western social trades throughout years [11]. Simultaneously, World Legacy Destinations address crystallization of human insight as well as affirmation of mankind's set of experiences, culture and craftsmanship, and these top notch the travel industry assets give a complex improvement space for Macau's travel industry improvement, which has turned into the way in to Macau's travel industry that recognizes it from elsewhere. As a matter of fact, an ever increasing number of vacationers are coming to Macau, no longer as a result of Macau's gaming as well as media outlet, but since of seeing Macau World Legacy Site. Macau can change its travel industry picture through the preparation as well as advancement of nearby World Legacy destinations. Fast financial improvement of central area likewise gives a unique chance for Macau the travel industry. To advance the normal improvement of the travel industry in Guangdong, Hong Kong and Macau, Guangdong Common The travel industry Organization, Hong Kong The travel industry Affiliation and Macau Government The travel industry Office have laid out the "Pearl Waterway Delta The travel industry Advancement Association". The establishing of the advancement organization and the kickoff of the web-based site have worked with the advancement of the travel industry assets and items, the combination of the travel industry assets and sharing of travel industry markets in Guangdong, Hong Kong and Macau.

At the point when Macau, as different urban areas in the district, sought after modernization with an accentuation on monetary advancement, many view city as generally effective as far as rescuing priceless metropolitan legacy against extraordinary requests for redevelopment, particularly when contrasted with urban areas like Hong Kong or Singapore. Hong Kong, with a lot more limited history, generally decided to surrender its constructed pioneer patrimony to exigencies of market economy, while Singapore has ostensibly

produced a formative way by which legacy is made do with qualified accomplishment inside the primary purpose of cleaned and arranged progress [12]. Success of Macau's urban conservation looks like a combination of private and government-led efforts, stringent regulations as well as institutional safeguards, growing awareness of potential for heritage tourism. Despite the absence of comprehensive development planning, policymaking was fragmented, favoring continuity over radical change. In mid 1990s, property abundance from neighborhood land over-hypothesis loosened up venture strain to redevelop ghetto plots. Subsequently, adequate significant legacy sections have been permitted to stay for some to guarantee the progressive Macau organizations' preservation endeavors as a "win of incrementalism".

However the circumstance was ostensibly more irresolute. A differentiating position fights that, had drives been carried out sooner to control unregulated turns of events, considerably more might have been saved. The Heritage Law of 1984, according to some critics, had in fact come too late to reverse the "damaging effects" of generic modern developments replacing traditional fabric from previous decade. The feeble organization most presumably kept the UIPs casual for political convenience. Eventually, those fastidious rules - purportedly upheld for lesser advancements on Taipa island yet disregarded for petulant ones on Macau promontory - just applied restricted impact, particularly outside safeguarded zones and assigned legacy sections. While preservation guidelines recognized the extended extent of metropolitan legacy, lopsided application undermined their viability to manage benefit driven advancements and maintain arranged values practically speaking [13].

Transition, Cultural Legacy and Fabricated Heritage

What is certain is that legacy protection shaped a necessary piece of the Portuguese organization's endeavor to sustain its social heritage in Macau. In any case, since marking of Sino-Portuguese Joint Statement in 1987 that settled Macau's retrocession to China, principal vehicle for supporting social personality fairly moved past the esteeming of existing assembled legacy [14]. During twelve-year change period, increasing of exhibition halls, erection of landmarks and models are supplemented with arranging of imaginative occasions, celebrations, advancement of Macau's dialects, food, performing expressions and related scholastic talk; all adding to developing the picture of the Portuguese as harmless pilgrims and social sponsors [15]. Along with a shiny new Social Community, the spate of exhibition hall projects give vaults and settings to different narratives and social substance, while initiation of 13 new open landmarks and sculptures in the last seven years of Portuguese organization is intended to remember soul of amizade or Luso-Chinese friendship and understanding. After Tian'anmen Square massacre in June 1989, Chinese foreign policy played off "friendly" Portuguese against "hostile" British in relation to upcoming transition of Macau and Hong Kong [16]. This cooperative "friendship" has a political undertone.

Although the "friendship landmarks" are supposed to symbolize "cordial relationship between two national authorities as well as harmonious coexistence of 2 peoples. Dissimilar to the sluggish advancing conventional metropolitan texture that has been coordinated into the neighborhood awareness, for example, those deep rooted frontier style buildings along Avenida Almeida Ribeiro, these unblemished memory helper symbols will more often than not be prominent for their actual strength and as outsider interruptions in city. Local people view them as separated from daily existence and significance, griped about wasting public assets to pay for such lavish bits of "manufactured legacy" [17]. Further debilitating of Portuguese organization's authenticity since 1990s expanded their readiness to co-work with China to guarantee a smooth exchange to Chinese rule. Thus, this added to the public authority's tension to design recently devised legacy for their authentic worth, halfway inspired by a paranoid fear of fast scattering of Lusitanian presence after handover. With implied support of Chinese specialists, Macau government kept on manufacturing such amizade developments straight up to 1999 [18].

After resumption of Chinese purview on twentieth December 1999, Macau was enriched with its new status as an Extraordinary Regulatory District (SAR), following Hong Kong two years sooner. Working under rubric of "one country, two frameworks", keeping up with its previous lifestyle and entrepreneur economy for following five decades is obliged. Fledging SAR government, in its endeavor to keep up with soundness as well as independence, proceeds with the cultivating of Macau's multicultural character. As a matter of fact, a few have noticed the squeezing need to cling and upgrade an unmistakable social personality, specifically supporting the imperativeness of Macau's "Latin layers" to keep up with the city's uniqueness against the unavoidable surge of central area impact [19].

As the most unmistakable sign of social exchange in Macau, the enduring remnants of half and half Luso-Asian engineering, milestones and metropolitan spaces are obviously seen to exemplify significant usufructory esteem worth passing on, as social legacy with which people in the future could recognize. However during progress stage, "moment legacy" were excitedly introduced to address "companionship" and "social getting it". Ostensibly these politically more secure recognitions featured a more brought together and impartial message conflating Macau's "co-employable" mentality 6 with Portuguese social kindness. Pre-handover legacy, by correlation, are significantly more heterogeneous, holding onto additional irresolute and contestable implications including pilgrim affiliations and social cacophony that were less managable to practical reappropriation, bound to hamper political basic for a "smooth" change [20].

2. MATERIALS AND METHODS

In this review, we examine about the circumstance of how social legacy in Macau is protected and research into the historical backdrop of social legacy conservation and financial turn of events. As per records in tenth December, 1953, Macau Lead representative Marques Esparteiro selected a board of trustees to "affirm the current compositional social legacy". This is the initial time in Macau history when Macau has authoritatively recorded about legacy assurance. Another Macau Lead representative Jaime Silvério Marques, named another functioning gathering to "study and propose proper measures to safeguard and esteem verifiable and imaginative legacies". However, the insurance of social legacy around then was restricted to individual structures, temples, castles and posts. By 1976, Macau government had likewise proclaimed a few regulations to affirm a few pieces of safeguarding locales and laid out another commission to be liable for the insurance of social legacy. The primary thorough announcement of social legacy security of proclaimed on seventh August, 1976. Order number 34/76/M affirmed the rundown of safeguarded structures, compositional complex and areas. It laid out another commission straightforwardly under Macau Lead representative Macau Metropolitan Board for the Security of Scene and Social Property (which is the Legacy Insurance Commission). The declaration characterized and ordered the articles under social security interestingly, and a sum of 89 things are recorded for social legacy insurance. On third June, 1884, Macau government proclaimed another demonstration of social legacy assurance, number 56/84/M. The new pronouncement canceled the previous 34/76/M declaration, and grouped and distinguished the social legacies in Macau with a further thorough definition. It was a declaration which definitively portrayed each security strategies to each social legacy.

As referenced over, the Notable Focal point of Macau is a gathering of squares as well as structures which were built for different capabilities in various periods as well as styles. Everybody has its own uniqueness which makes it particular from others. Subsequently, it appears to be sensible that a particularly different gathering of structures should be overseen and worked by unambiguous supervisory groups in regards to their classes to streamline the advantage of utilizing or reusing. Adaptive reuse within heritage may jeopardise the building's uniqueness, nevertheless, as the building's ordinary purpose is part of its uniqueness and the reason it was designated as such. It is possible for the structure to lose its inherent uniqueness and perceived values if its conventional capability is lost and its design is altered. The Noteworthy Focus of Macau is used as a ploy to entice tourists in order to profit from its designation as a WHS. Businesses such as restaurants and souvenir stores opened in the vicinity of the site, or even on it, support zone was developed as a commercial area. One further type of reuse that Cheong doesn't mention is the utilisation of 21 operational heritage structures as workplaces or company stores. The interior layouts of the Leal Senado Building and Heavenly Place of Kindness have been completely redesigned to accommodate this shift. As I would like to think, this is an unseemly kind of reuse which doesn't think about much according to the viewpoint of protection and emphasis of OUVs. It is a decision that fails to achieve the goals of adaptive reuse because it only considers the reuse portion and disregards the intrinsic values. Concerning just the chance of reusing working for advancement will eradicate the qualities that make legacy. Subsequently, in the wake of losing its OUVs, legacy property is standardized into a structure with extraordinary plan for business as well as useful purposes. Another popular legacy reuse for the travel industry is Macao Light Celebration, which are sent off by public authority at destinations of Noteworthy Focus of Macau starting around 2015 for drawing in legacy the travel industry (fig.1-2). Each legacy building has been required for the occasion 'to attract guests to various areas of the city for an enthusiasm for Macao around evening time and to find out about nearby culture as well as history from creative points molded by light masterfulness'.

Figure. 1 St. Paul's Ruins during Macao Light Festival 2017

Figure. 2 St. Lawrence's Church during Macao Light Festival 2017

the analysts meant to figure out what spatial highlights can communicate unmistakable Portuguese culture (Figure 2). To this end, metropolitan surface regions with delegate qualities were chosen as fundamental objects of examination in this review. Besides, scientists intended to look at the morphological contrasts among Portugal and Macau from an AI viewpoint and investigate the connection between's them. Using image processing as well as analysis methods, it is possible to show how much Portuguese architecture influenced Macau and to provide a basic grasp of the link between the two regions. Not only will this study help shed light on the connection between Portuguese architecture and Asian cities, but it will also shed light on tourism potential of Portuguese spaces. Figure 3. A few comparable spatial elements between Lisboa, Portugal, Macau, China.

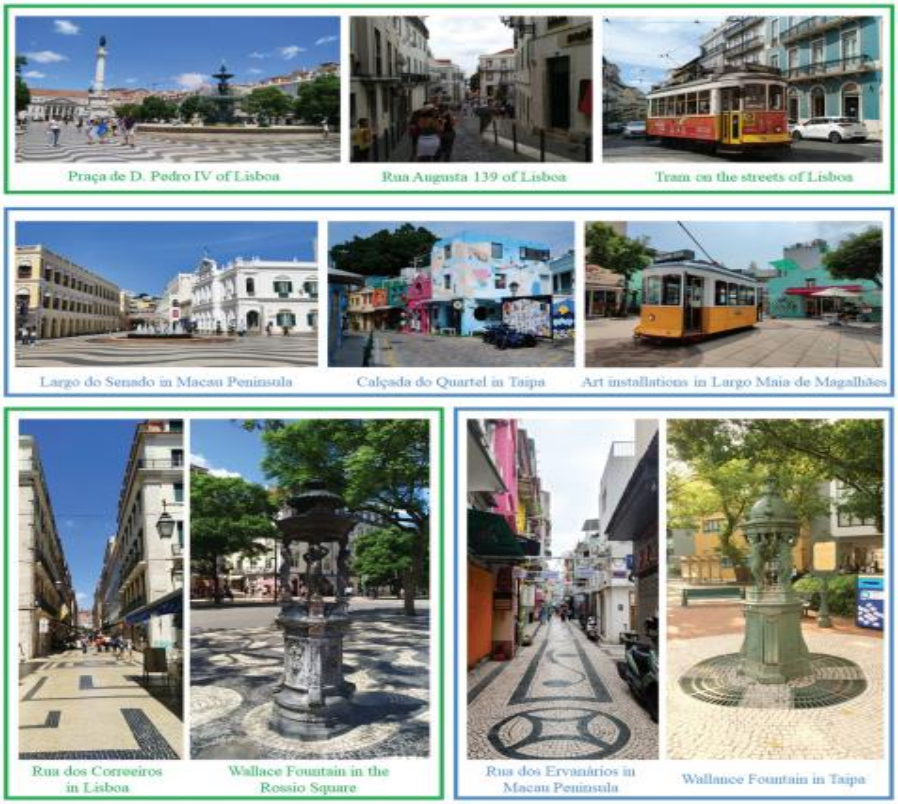

Figure 3. Some similar spatial features between Lisboa, Portugal, and Macau, China

Macau was chosen as the objective for this situation study to dissect gathered internet based audits from TripAdvisor to distinguish vacationers' qualities, to fragment the social the travel industry market, and to anticipate imminent sightseers' inclinations as respects to the legacy attractions. TripAdvisor is an unmistakable internet based data trade stage, on which vacationers from everywhere world post as well as offer remarks on movement related subjects. In second quarter of 2015, TripAdvisor-marked locales got a month to month normal of 375 million particular guests, which gives scholastic scientists a rich information hotspot for examination. Contrasted and overview based information assortment, the most common way of acquiring information is predisposition impartial, which limits the specialist's bias and individual impedance. The four steps of this study's research design are depicted in Figure 4.

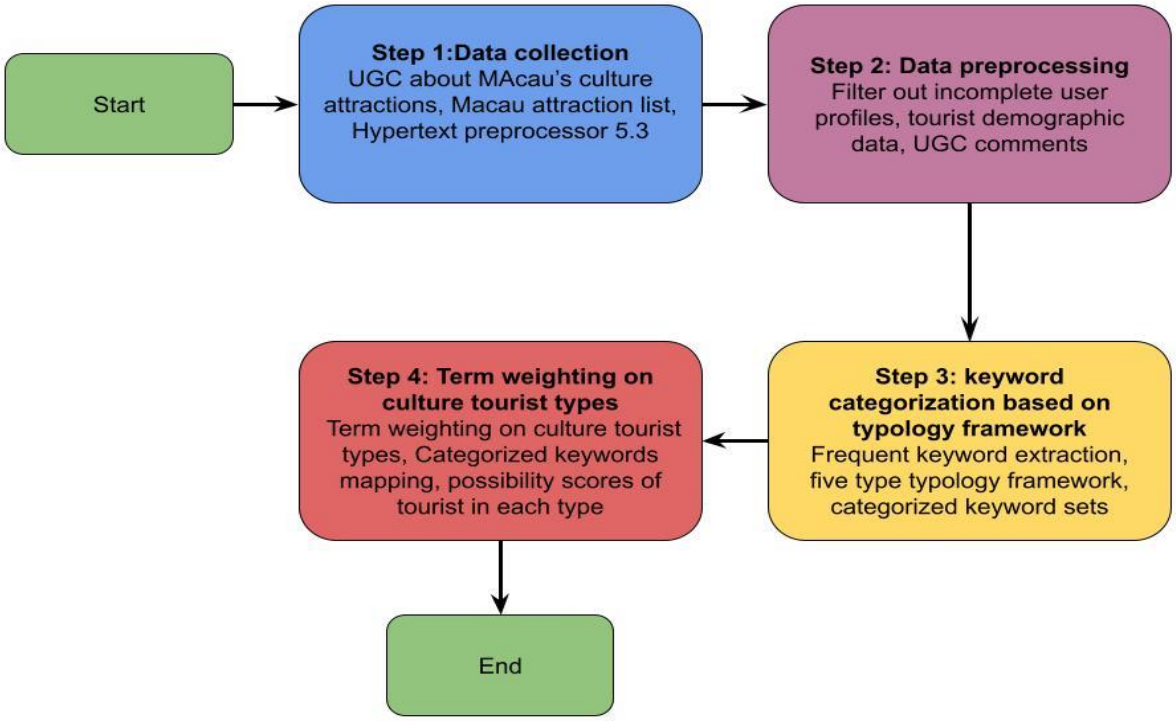

Figure. 4 Proposed term-weighting method for culture tourist type identification

Data collection stage: Images of architectural textures from Portugal's historic cities of Lisboa, Porto, Évora, and Guimaraes are gathered for this study. The OpenStreetMap database is the source of these data. The digitised map that Macau Cartography as well as Cadastre Bureau produced in 2022 is used in this project to acquire architectural texture photographs of Macau Peninsula as well as its neighbouring islands.
Data processing stage: To facilitate training of method, this research divides gathered samples into pictures with a size of 512 × 512 pixels, which corresponds to a range of 250 × 250 metres on map. Next, samples are split into two groups: target samples and training samples. Training samples are primarily unified and cropped for Portugal's four cities. The study team manually filters away images that have less information or don't have the typical features of Portuguese cities to increase significance of the method training process, ultimately yielding 354 valid samples. The goal sample simply requires basic cropping and unified processing, yielding 736 photos, as it does not require model training.

Gradient reinforcement transfer neural network with kernel vector component optimization model:

Batch-wise training variations originate from the gradient variance. The noisy gradient is a drawback of employing a random sample to approximate population; it requires far less computations each cycle. Note that this section uses iterations to measure convergence rate. We must first define the Lyapunov process in order to examine the training dynamics for each iteration by eqn (1)

$$h_t = \|\mathbf{w}^t - \mathbf{w}^*\|_2^2 \qquad (1)$$

Distance between present solution w t as well as optimal solution w is measured by equation. ht is a random variable. As a result, SGD convergence rate is calculated using Eqs. 2:

$$h_{t+1} - h_t = \|\mathbf{w}^{t+1} - \mathbf{w}^*\|_2^2 - \|\mathbf{w}^t - \mathbf{w}^*\|_2^2 = (w^{t+1} + w^t - 2w^*)(w^{t+1} - w^t) = \big(2\mathbf{w}^{\mathrm{t}} - 2\mathbf{w}^* - \eta_t \nabla\psi_{\mathbf{w}}(\mathbf{d}_t)\big)\big(-\eta_t \nabla\psi_{\mathbf{w}}(\mathbf{d}_t)\big) = -2\eta_t(\mathbf{w}^t - \mathbf{w}^*)\nabla\psi_{\mathbf{w}}(\mathbf{d_t}) + \eta_t^2\big(\nabla\psi_{\mathbf{w}}(\mathbf{d_t})\big)^2 \qquad (2)$$

It indicates how far an iteration progresses towards w Reduced VARw(dt) improves convergence rate. Eq.3 predicts average convergence rate at precision of an iteration.

$$\mathbf{E}\{h_{t+1} - h_t\} = -2\eta_t(\mathbf{w}^t - \mathbf{w}^*)\mathbf{E}\{\nabla\psi_{\mathbf{w}}(\mathbf{d}_t)\} + \eta_t^2\mathbf{E}\left\{\big(\nabla\psi_{\mathrm{w}}(\mathbf{d}_{\mathrm{t}})\big)^2\right\}$$
$$= -2\eta_t(\mathbf{w}' - \mathbf{w}^*)\mathbf{E}\{\nabla\psi_{\mathbf{w}}(\mathbf{d}_t)\} + \eta_t^2(\mathbf{E}\{\nabla\psi_w(\mathbf{d}_t)\})^2 + \mathrm{VAR}\{\nabla\psi_w(\mathbf{d}_t)\}$$

$$h_{t+1} - h_t < 0 - (\mathbf{w}^t - \mathbf{w}^*)\mathbf{E}\{\nabla\psi_{\mathbf{w}}(\mathbf{d}_t)\} < 0 \qquad (3)$$

E{∇ψw(dt)} is unbiased evaluate of E{∇ψw(d)}.
Therefore, in this example, increasing each iteration's contribution is equivalent to decreasing VAR{∇ψw(dt)}. There has been enough discussion of this viewpoint. An iteration's contribution, ht+1 ht, fluctuates in relation to dt. Eqs. 29 and 30 state that variance of ht+1 ht is as follows by eqn (4,5)

$$\mathrm{VAR}\{h_{t+1} - h_t\} = 4\eta_t^2(\mathbf{w}' - \mathbf{w}^*)^2\mathrm{VAR}\{\nabla\psi_{\mathbf{w}}(\mathbf{d_t})\} + \eta_t^4\mathbf{VAR}\left\{\big(\nabla\psi_{\mathrm{w}}(\mathbf{d}_t)\big)^2\right\} \qquad (4)$$

$$-2\eta_t^3(\mathbf{w}_t - \mathbf{w}_z)\mathbf{COV}(\nabla\psi_{\mathbf{w}}(\mathbf{d_t}), \nabla\psi_{\mathbf{w}}(\mathbf{d_t})^2\} \qquad (5)$$

The formula indicates that gradient updates do not add equally to VAR{ht+1 – ht}, 0. ht+1 ht and dt are related, as can be shown by looking at how finding variables in this equation, ∇ψw(dt) 2 and ∇ψw(dt), depend on dt.
This innovative approach motivates our research on how to handle load balance issue in training as well as factors in dt that affect convergence rate ht+1 ht. The variance reduction on ∇ψw (dt) has been the subject of numerous investigations, although relatively few have used this method. Once every k iterations, the update indicated in equation (6) is carried out:

$$z(k+1) = z(k) - \alpha_k\bar{g}(k) \qquad (6)$$

Stepsizes must meet conditions $\alpha_k = \frac{1}{\mu k}$, and $\bar{g}(k) = \frac{1}{n}\sum_{i=1}^{n} g_i(z(k), \xi_i(k))$, i.e., $\bar{g}(k)$ meaning that g(k) is average of n noisy gradients calculated at z(k). Here, n is sample data size, oi is rebuilt data, and oi is target data to which rebuilt data is compared. With the ability to reconstruct the data, a better organisation of hidden layer data are obtained. Within a single method, we implement our technique by integrating concepts of feature selection to choose significant data as well as auto-encoder to compress data by eqn (7)

$$\min_{W_{\mathrm{in}}, W_{\mathrm{out}}, v_{\mathrm{in}}, v_{\mathrm{out}}, Q} \frac{1}{2}\| P - g(f(P))\|_F^2 + \frac{10\lambda}{5}\mathcal{C}(Q, f(P)) \qquad (7)$$

The standardised form of significant data selection is given as (Q, f(P)). Specifically, in Q, vector of i th column is given as qi Srsvin, which is expressed as eqn (8)

$$q_i = [0, \ldots, 0, 1, 0, \ldots, 0]'$$

$$\mathcal{C}(Q, f(P)) = \frac{\mathrm{Tr}\,(Q' f(P) M l_w f'(P) Q)}{\mathrm{Tr}\,(Q' f(P) M l_b f'(P) Q)} \qquad (8)$$

That provides a fundamental strategy for dealing with numerous cases by choosing Mlb and Mlw in various ways. To collect data in a supervised manner, our suggested system employs the fisher score supervised approach. For the fisher score, two undirected graphs Gb and Gw are constructed utilizing available data. As a result, Laplacian matrices are given asMlw = Mdw Mww, where Mdw is diagonal matrices of Mlb and Mwb. By equating the following optimisation problem, we may obtain selection of feature matrix Q that produces subset of features with lowest criterion score by eqn (9)

$Q = \arg\ \min_Q \frac{\mathrm{Tr}\,(Q'f(P)Ml_wf'(P)Q)}{\mathrm{Tr}\,(Q'f(P)Ml_bf'(P)Q)}$ (9)

Unfortunately, because to the lack of closed-form resolutions, there has not been a direct issue to fix aforementioned trace-ratio concerns. As a result, rather of dealing with trace-ratio concerns directly. Many occupations want to switch to comparable trace-various issues in order to achieve a worldwide solution for optimisation. Assume the subset-level standard score is (Q, f(P)) in (10) goes up to global lowest satisfying,

$\lambda^* = \arg\ \min \frac{\mathrm{Tr}\,(Q'f(P)Ml_wf'(P)Q)}{\mathrm{Tr}\,(Q'f(P)Ml_bf'(P)Q)}$ (10)

This is to show that by eqn (11)

$\Rightarrow \frac{\mathrm{Tr}\,(Q'f(P)Ml_wf'(P)Q)}{\mathrm{Tr}\,(Q'f(P)Ml_bf'(P)Q)} \geq \lambda^*, \forall Q \Rightarrow \mathrm{Tr}\,(Q'f(P)(Ml_w - \lambda^* Ml_b)f'(P)Q) \geq 0, \forall Q \Rightarrow \min_Q \mathrm{Tr}\,(Q'f(P)(Ml_w - \lambda^* Ml_b)f'(P)Q) = 0$ (11)

At this point, represent function of by utilising others as constants, such as by eqn (12)

$$R(\lambda) = \arg\ \min_Q \mathrm{Tr}\,(Q'f(P)(Ml_w - \lambda Ml_b)f'(P)Q)$$

$\min_{W_{\mathrm{in}},W_{\mathrm{out}},v_{\mathrm{in}},v_{\mathrm{out}},\lambda} \mathrm{m} = \frac{1}{2} \parallel P - g(f(P)) \parallel_F^2 + \frac{\gamma}{2} \mathrm{Tr}\,(Q'f(P)(Ml_w - \lambda Ml_b)f'(P)Q)$ (12)

Two layers make up the proposed RL route planning algorithm. One is the lowest layer, which takes into account the whole knowledge of the static hurdles while designing a long-term plan. The other is a higher layer that focuses on a short-term plan while taking into account local knowledge of shifting barriers. To create a path without collisions, the two layers are coordinating their efforts. The following are detailed steps. On-board sensors are actively searching for moving obstruction at each time step. Dynamic Q-learning of upper layer is engaged as soon as a moving obstacle is recognised within sensor range. Identifying the location of the closest moving barrier and the desired direction. Then, all of the upper layer's Qvalues for the present state are recovered. All of the bottom layer's Q-values for the present state are likewise retrieved at the same time. The action with the highest Q-value will be developed after carefully taking into account the Qvalues of both the higher and lower layers, and this action is the best option at the moment. Up till the objective is accomplished, repeat the process.

First step in modelling method is deciding which candidate methods are utilized in experiment. This would include going over earlier research and figuring out popular forecasting models that have worked in the past. Then, each model may be tested on every feature subset as well as subsets selected using feature selection techniques. By experimenting with different feature selection strategies as well as classification methods best classifier as well as feature selection method will be discovered by eqn (14)

$$\min_{\mathbf{w},b}\ \frac{1}{2}\mathbf{w}^T\mathbf{w} + C\sum_{i=1}^n \xi_{i,t}$$
$$\text{subject to}\quad y_i(\mathbf{w}^T\mathbf{s}(\mathbf{x}_i) + b) \geq 1 - \xi_{i,t},$$
$$\xi_{i,t} \geq 0, \text{for } i = 1, \dots, n,$$
$$\mathrm{Max}_\alpha\ \sum_{i=1}^n \alpha_i - \frac{1}{2}\sum_{i=1}^n\sum_{j=1}^n \alpha_i\alpha_j y_i y_j K(\mathbf{x}_i, \mathbf{x}_j),$$

subject to $\sum_{i=1}^n \alpha_i y_i = 0, 0 \leq \alpha_i \leq \mathrm{C}, i = 1,2, \dots, n$ (13)

$$\max_\alpha\ -\frac{1}{2}\sum_{i,j=1}^N y_i y_j K(x_i, x_j)\alpha_i\alpha_j + \sum_{j=1}^N \alpha_j$$
$$\text{subject to } \sum_{i=1}^N \alpha_i y_i = 0$$
$$0 \leq \alpha_i \leq c, i = 1, \dots, N.$$

$K(x,z) = \varphi(x)^T\varphi(z) = \sum_{j=1}^{n_h} \varphi_j(x)\varphi_j(z)$ (14)

K(xi, xj) = s(xi, s(xj) >, where s(xi, s(xj) > is the inner product operator, is a kernel function. The dual variables are the i's. Index set of support vectors, or SV, is denoted by notation j | j > 0 for j = 1, 2,..., n. Equation (15) can be used to write all of data xi, i SV as kernel form of the SVM border.

$\sum_{i\in SV} \alpha_i y_i K(\mathbf{x}_i, \mathbf{x}) + b = 0$ (15)

$D(\mathbf{x}) = \sum_{i\in SV}\ \hat{a}_i y_i K(\mathbf{x}_i, \mathbf{x}) + \hat{b}'$ (16)

where the anticipated value of andz is represented by the symbol an. It is shown that, in theory, bias term bj is applied to each and every instance of SV. Since j-th support vector xj is used to produce bj, evaluated biassed term b is actually evaluated by eqn (17) as mean of all calculated biassed terms at all support vectors.

$b_j = y_j - \sum_{i\in SV}\ \hat{a}_i y_i K(\mathbf{x}_i, \mathbf{x}_j).$ (17)

Using the one-versus-all technique, a k-category classification issue often be decomposed into a sequence of binary classification problems, where class label yi takes values from 1,..., k by eqn (18)

$D_m(\mathbf{x}) = \sum_{i\in SV_m}\ \alpha_i^{(m)} y_i^{(m)} K_m(\mathbf{x}_i, \mathbf{x}) + b^{(m)}$ (18)

Using evaluated decision functions from all m-th binary classifications, a majority voting procedure determines final class label of an instance. A wide variety of standard kernels are available for the R-QNN approach. One example by equation (19) is radial kernel $K(\mathbf{x}, \mathbf{x}') = \ddot{f}(-\|\mathbf{x} - \mathbf{x}'\|^2/2)$, which is GRBF kernel.

$K(\mathbf{x}, \mathbf{x}') = \exp\,(-\|\mathbf{x} - \mathbf{x}'\|^2/2\sigma^2)$ (19)

Specific kernel functions have been created for a number of application domains, including bioinformatics and text mining. Equation (20) provides interpretation of a normalised kernel function with respect to a pair of feature space points.

$$\cos\ \theta_{\varphi(x),\varphi(z)} = \frac{\varphi(x)^T\varphi(z)}{\|\varphi(x)\|_2\|\varphi(z)\|_2} = \frac{K(x,z)}{\sqrt{K(x,x)}\sqrt{K(z,z)}} \quad (20)$$

One can even accept that some data points are outside of the tube by using slack variables ξi and ξ ⋆ i, as shown by equation (21).

$$(\mathrm{P}) \min_{w,b,\xi_i,\xi_i^*} \frac{1}{2}w^T w + c\sum_{i=1}^{N}(\xi_i + \xi_i^\star)$$

$$\text{subject to } y_i - w^T\varphi(x_i) - b \le \epsilon + \xi_i,\ i = 1,\dots,N$$

$$w^T\varphi(x_i) + b - y_i \le \epsilon + \xi_i^\star,\ i = 1,\dots,N$$

$$\xi_i, \xi_i^\star \ge 0,\ i = 1,\dots,N \quad (21)$$

$$y_i - w^T\varphi(x_i) - b \le \epsilon + \xi_i,\ i = 1,\dots,N \quad (22)$$

Choice of {, c, and kernel function will determine the number of support vectors. A polynomial kernel with degree d is an example of another kind of kernel that has form of the inner product K(x, x o) = f(< x, x o >) by eqn (23)

$$K(\mathbf{x},\mathbf{x}') = \exp\left(-\|\mathbf{x}-\mathbf{x}'\|^2/2\sigma^2\right) \quad (23)$$

From a geometric perspective, the Riemannian metric is induced in the input space I when the feature space F is the Euclidean space.

3. Experimental analysis:

Python Keros is used to implement our system. The RMS prop optimizer and the binary-cross entropy based loss function are employed in our model. Over 120 trials, we experimented with testing sets for classification models.

the engraving of the Memorable Focus of Macau into UNESCO World Legacy Rundown in 2005 unquestionably expanded perceivability of social assets of city, providing it with a global stamp of value. From that point forward, the nearby specialists have been utilizing it to repackage Macau's travel industry item, reposition its objective picture. UNESCO engraving improved perceivability of Macau as a social city, however its principal resources are exceptional blend of classical structures in verifiable focus, tradition of Portuguese and Chinese dwelling a together in the little area. According to Ung & Vong (2010), top five significant social destinations in Macau were Taipa Town (No. 4), the A-Mama Sanctuary (No. 3), the Remains of St Paul's Church building (No. 1), Senado Square (No. 2), combined site of Carmel Nursery and Taipa Praia (No. 5). Historical Centre of Taipa Houses, which is the fifth most popular social site, is where visitors may access the fully protected former Portuguese pioneer officers' residences across Taipa. In their list of Macau's must-see sites, Wong and McKercher (2012) confirmed findings of Ung and Vong (2010), adding that Mount Post was also a popular destination for all-inclusive package travellers. One more investigation of Wong and McKercher's (2011) announced that the ofcial vacationer data counter principally suggests locales of the Verifiable Focal point of Macau to free travelers, including 22 structures and 8 piazzas/squares.

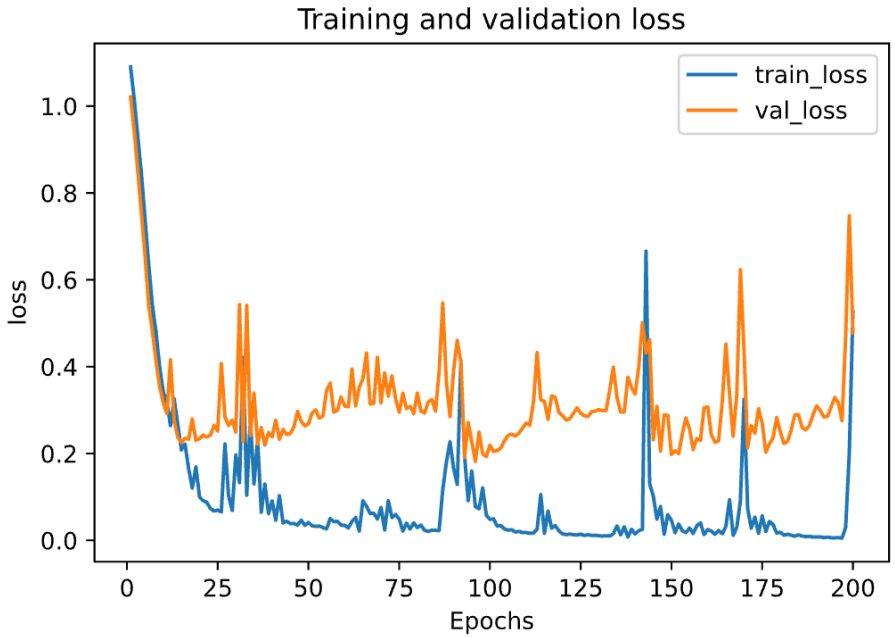

Figure 5: Image of human tracks in heritage area

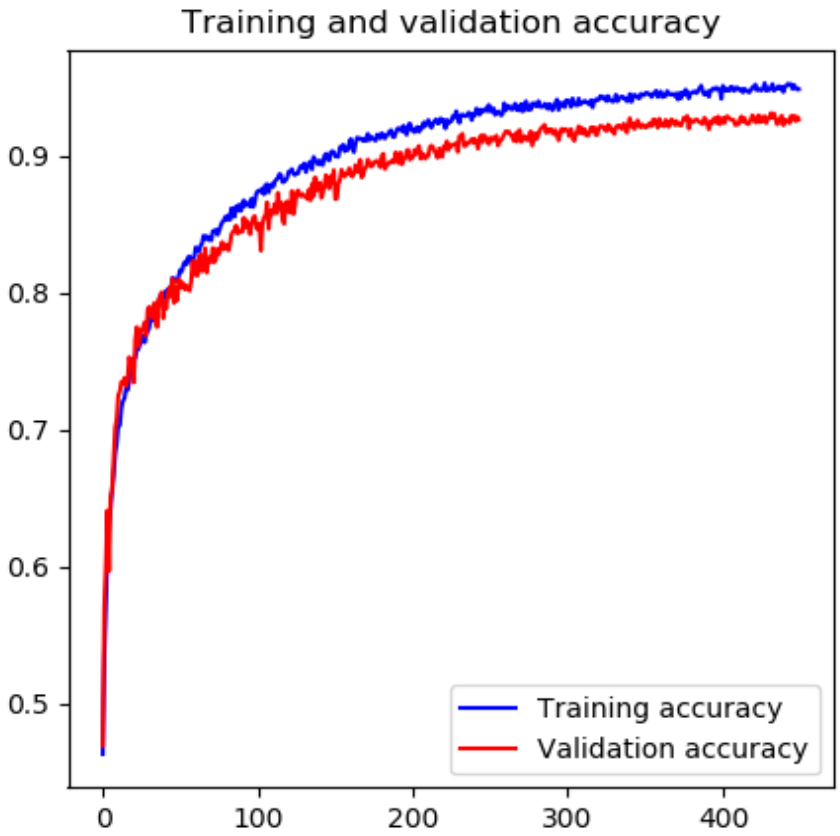

Figure 6: Loss in training and validation.

Figure 5 illustrates how the loss value decreases as the time value increases. Better outcomes are obtained from DCNN when loss value is smaller. Nevertheless, any additional reduction in loss causes the model to become overfit when data loss is approaching zero. The model loses usefulness when it becomes overfit. Training and validation data for created ML method are shown in Figure 6.

Table-1 Comparative analysis of macau heritage data

Parameters	DCNN	SVM	GRTNN_KVCO
Training Accuracy	91	94	97
RMSE	38	40	35
Specificity	88	90.5	92
F-Measure	85	86	87

The above table-1 shown comparative analysis of macau heritage data in terms of training accuracy, RMSE, recall, specificity and F1 score. The existing technique compared are SVM and DCNN with proposed GRTNN_KVCO. proposed GRTNN_KVCO obtained accuracy of 97%, SVM attained 91%, DCNN obtained 94% as shown in figure-7. RMSE of proposed GRTNN_KVCO attained 94%, ISP obtained is 93% and 93.8% by DCNN given by figure-8. Specificity of proposed GRTNN_KVCO is 92%, 88% by SVM and DCNN attained 90.5% as shown by figure 9. F-1 score obtained by proposed GRTNN_KVCO 87%, SVM achieved 85%, DCNN attained 86% given by figure-10.

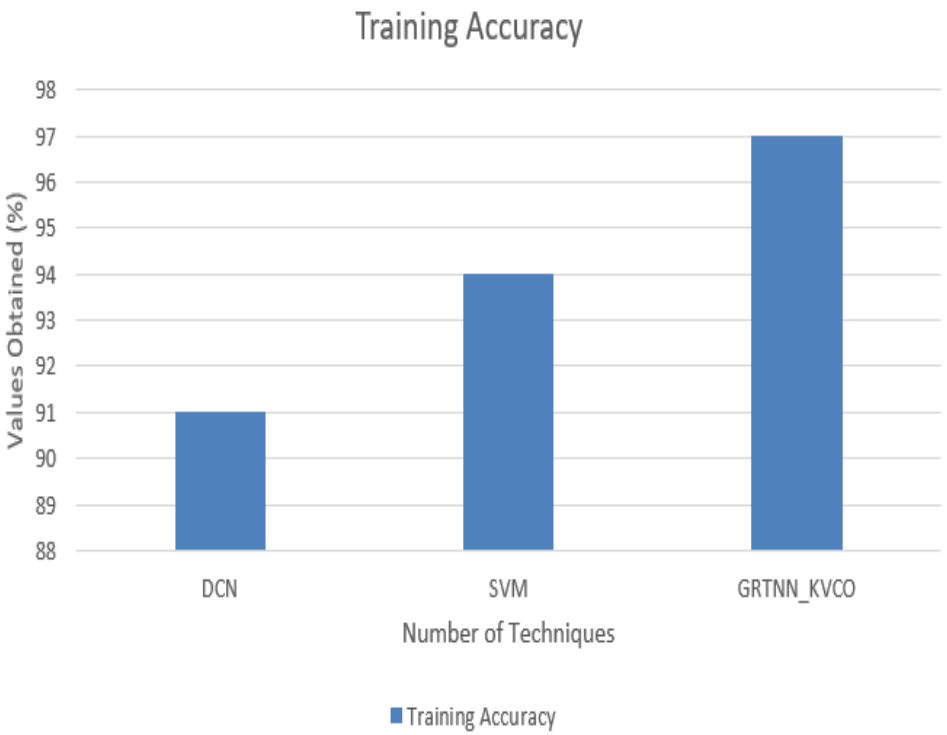

Figure-7 Comparison of training accuracy

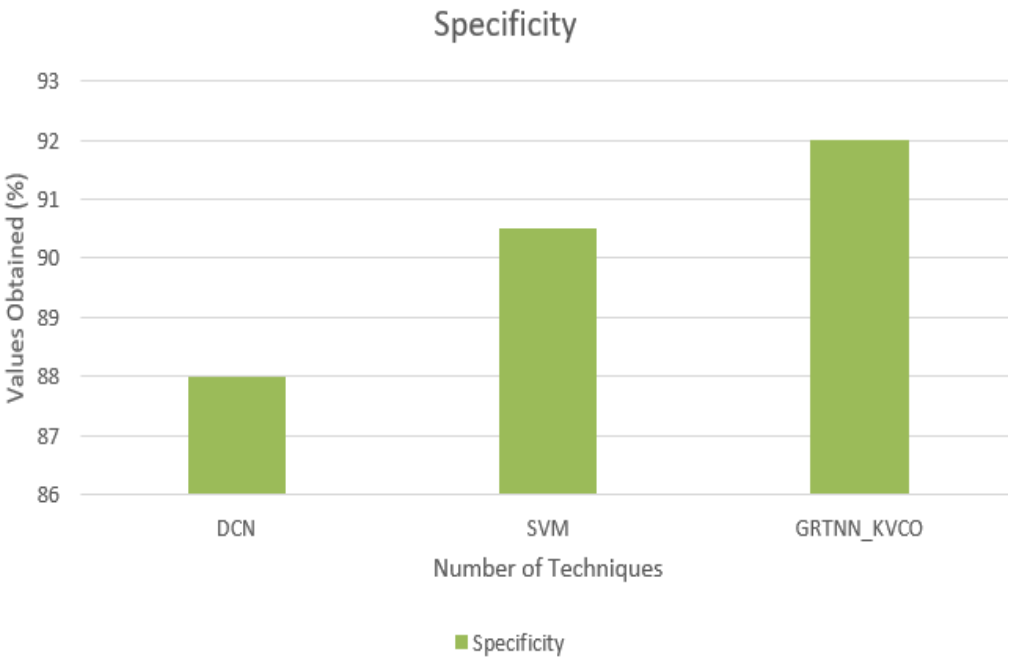

Figure-8 Comparison of specificity

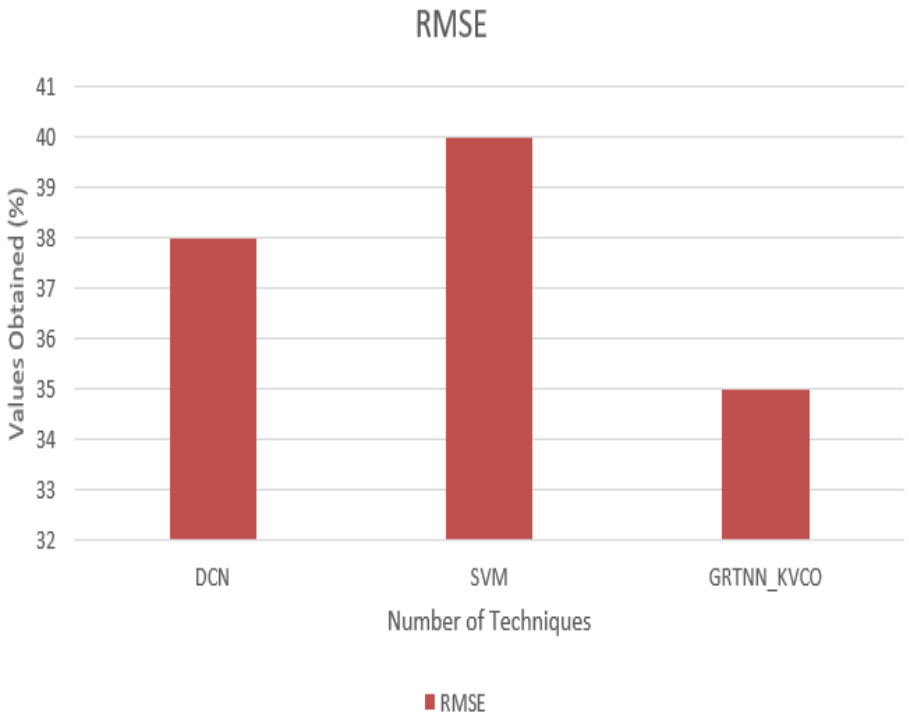

Figure-9 Comparison of RMSE

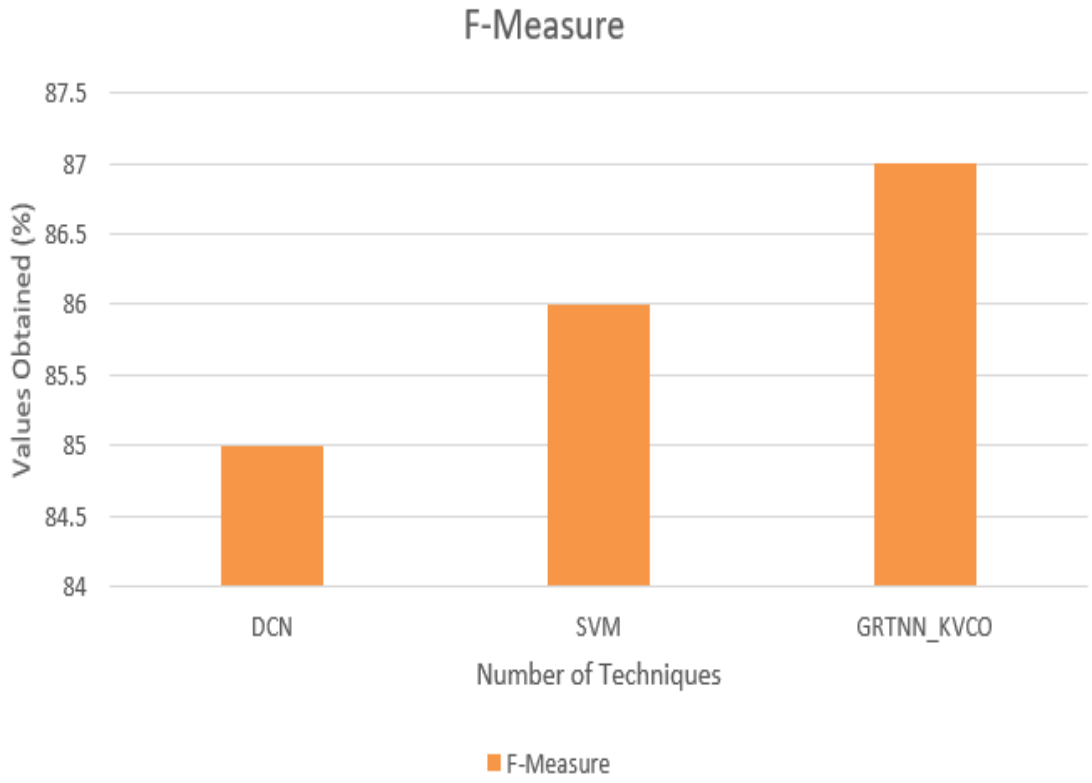

Figure-10 Comparison of F-Measure

the comparable area of Macau Landmass to Evora is situated in fringe area of Macau. Similarities with Lisboa are clearly concentrated in middle of Macau Peninsula, while those with Porto and Guimaraes are merely average. In light of recognized cut places of Macau's distant islands, comparable situations between Macau's peripheral islands and Evora, Porto, and Guimaraes are normal. The eastern region has a morphology that is comparable to Lisboa (Figure 13). Furthermore, the quantity of cuts distinguished on the Macau peripheral islands is a lot more modest than that on Macau Promontory. From one perspective, quantity of structures on Macau's distant islands is not exactly that on Macau Landmass. Then again, metropolitan preparation and advancement of Macau's distant islands is moderately late, metropolitan spatial surface is more current. The

majority of the recognized metropolitan cuts are situated in the terminal freight terminal region. This is additionally in light of fact that the advancement history of distant islands is totally different from that of Macau Landmass. Before, most of Taipa and Coloane's transportation was led by boat, especially during underlying free island time frame. Be that as it may, in the space of remote islands, first island structure is mostly mountains. There are not many spots where anglers can settle, predominantly town settlements at foot of mountain or fishing towns on ocean. As a result, ML process failed to locate a comparable large continuous area in this location, which is, original region of Taipa and Coloane's mountain ranges. Regions in which comparable metropolitan morphologies are identified are likewise fundamentally generally settled metropolitan communities, greater part of which were created from Chinese towns.

4. Conclusion:

This study proposes using historical methods to not only help heritage practitioners as well as cultural bearers choose and build official narratives but also to build a compassionate relationship between governments as well as cultural practitioners as they look to future together. Legacy studies has not seen an expansive mediation from area of history; in any case, a more clear and impartial comprehension of past is valuable in deciding if a component is fitting for protection and how legislatures can tie texture of the past, present, and eventual fate of customs, experts, and urban communities/states. There are no distinctions across age, orientation and districts among five social traveller types, while most social vacationers conveying touring purposes visit social site by occurrence or have an easy-going stroll with a shallow encounter. Findings suggest that legacy locales in Macau have drawn in guests; However, level of purposeful cultural tourists with extensive cultural experience that is expected of visitors to cultural sites has not yet been reached. All more significantly, the little extent of fortunate social travelers uncovers that Macau legacy destinations disappointed the guests on a fundamental level. The Macau government and the travel industry specialists might consider vertical improvement to underline the worth and embodiment of their legacy attractions and pass on real encounters to sightseers. In spite of not having a metropolitan surface of similar social foundation, metropolitan spaces with comparative surface formats can likewise rapidly be recognized as tourismpotential regions because of their trademark societies. Be that as it may, while consequently entering the advancement interaction, individual case assessments are as yet required, for example, assessing whether site is sensible as well as property privileges of structures in question. Regardless, through this review, scientists can see capability of applying AI calculations to mine trademark the travel industry likely regions according to the viewpoint of the metropolitan texture. The application of these two methods to comparative study of Portuguese as well as Macau architectural texture is not limited to scope of this study; rather, it is used as a model as well as source of inspiration for other fields of study that are related to architecture.

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