Renaissance of AI-Driven Semiotic Journey Narratives Through Visual Art: Cultural Heritage and History of Islam in Patani's Talaa Gong Fabric Patterns

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This research integrates multi-model language learning models (LLMs) in Generative AI, specifically Variational Autoencoders (VAEs), to preserve and represent cultural heritage through video art. Focusing on the Patani state, now encompassing the provinces of Pattani, Yala, and Narathiwat in southern Thailand, the study explores the historical role of Islam in shaping regional cultural practices. Talaa Gong garments serve as a key medium to symbolize the area's identity and memory. The study investigates two core aspects: the historical shifts of Islamic influence and its effects on local traditions, and the creation of modern textile patterns for women's Talaa Gong garments, complemented by video art reflecting the social dynamics of the region. Through fieldwork, including interviews with religious leaders, artists, and residents, the research demonstrates that combining Generative AI with artistic practices enhances cross-cultural engagement and cultural preservation. The findings reveal that this AI-driven approach offers a more refined analysis of cultural evolution, contributing to semiotic journey narratives via visual art, with a focus on the heritage and history of Islam in Patani's Talaa Gong fabric.
Keywords: deep learning, Pattani, Talaa Gong, visual art, variational autoencoders.

1. Introduction

The concept of space and territory is vital to human existence and identity, influencing both permanent and temporary ownership. Personal space, which varies based on factors such as age, status, lifestyle, and cultural context, serves as an expression of individual identity and contributes to a sense of security [1]. This space functions as a mechanism for individuals to control access to their personal domain, with behavior often manifesting in the personalization and defense of territory. Ownership of personal space is typically communicated through the arrangement of objects or specific markers, and individuals may take defensive actions when this space is invaded [1].

Islam, originating in Asia on the Arabian Peninsula, has played a significant role in unifying ancient civilizations such as Egypt, Persia, Greece, India, and China. Islamic art and architecture, shaped by religious principles, including the prohibition of depicting living beings, often feature arabesque patterns and geometric calligraphy. These intricate designs incorporate natural elements and stylized Arabic script, commonly seen in mosques and religious sites [2]. These patterns and symbols are essential in expressing the cultural identity and religious practices of Islamic communities.

Patani, an ancient Islamic state formerly known as "Langkasuka," now encompasses Thailand's southernmost provinces: Yala, Narathiwat, and Pattani. Historically, these provinces have played a significant role in preserving Islamic culture and religious traditions. However, since the onset of unrest in 2004, the region has been associated with violence, often overshadowing its rich cultural heritage. Contemporary art, particularly through mediums such as pattern design and video art, has emerged as a way to address the complex social issues in the region. These narratives challenge mainstream media's portrayal of violence, offering a more nuanced perspective on the local identity [2].

Focusing on Talaa Gong prayer garments, a significant cultural and religious symbol in the southern border provinces, this study integrates AI technology to not only preserve traditional patterns and create contemporary textile designs that communicate the social dimensions of the region, but also to investigate the evolution of cultural practices rooted in Islamic beliefs in Patani [3], [4]. Through the use of Generative AI (GenAI), particularly Variational Autoencoders (VAEs) combined with large language models (LLMs), the study generates accurate representations of cultural heritage in video arts. The introduction of GenAI in object detection has led to significant advancements, particularly through AI-driven approaches like VAEs, which generate high-quality, realistic images. These advancements go beyond basic image detection by enabling more interpretable representations, making them well-suited for image classification. Furthermore, integrating natural language processing into these algorithms enhances semantic captions, enabling semiotic journey narratives through visual art that explore cultural heritage and history across various contexts [5].

By utilizing cutting-edge GenAI technology, the study not only focuses on digital preservation but also opens new avenues for artistic expression, particularly in the design of patterns on the Talaa Gong garments. These AI-generated designs transcend traditional representations, reflecting the region's complex cultural narratives while challenging the often one-dimensional portrayals of the area in mainstream media. The visual artworks,

deeply embedded in Islamic rituals, serve as a conduit for fostering a deeper understanding of local identity and religious significance. Furthermore, the integration of GenAI in cultural heritage preservation promotes meaningful intercultural exchange, offering fresh perspectives and a richer analysis of cultural shifts in the southern border provinces [2].

2. Literature Review

Alexander Gottlieb Baumgarten (1714-1762) [6], deeply studied in aesthetic theory and its historical evolution, significantly shaped modern understanding of aesthetics. Before Baumgarten's contributions, ancient Greek philosophers like Plato and Aristotle focused on the notions of beauty and emotional impact, which are forms of human sense perception. They debated questions such as: What is beauty? Does the value of beauty exist independently, or is it merely an attribute we assign to things we like? How is beauty related to the beautiful? Are there fixed standards for judging whether something is beautiful?

The researcher has chosen video art as a medium to express experiential aspects derived from the space and Islamic religion within Southern Thailand, specifically the provinces of Pattani, Yala, and Narathiwat—regions often perceived as violent by outsiders and also the researcher's homeland. The objective is to reflect on the multidimensionality of the region, highlighting its multi-media, multi-racial, and multi-cultural dimensions to foster greater understanding. Religion serves as the central theme, with the Talaakong, a significant symbol for Muslim women, functioning as a core element.

Nam June Paik, a Korean artist and a key figure in the Fluxus movement, was the first to create video art. His groundbreaking work in 1965, using a portable Sony video camera, was recorded and displayed immediately at Café a-Go-Go in Greenwich Village, New York. Paik famously said, "TV has attacked us for a long time—now we strike back." [7], [8]

The researcher, inspired by Paik's use of technology to challenge perceptions, aims to counter the media-driven view of the Southern Thai provinces as violent regions. These perceptions, often shaped by TV and other visual media, will be reframed through video art as a tool for communication. Video art, frequently linked with performance art, can involve live performances, such as Paik's famous "TV Bra for Living Sculpture" with Charlotte Moorman, or recordings displayed on monitors in museums or galleries [9]. Some artists, like Bill Viola, have used video in a more narrative form, as seen in his Nantes Triptych (1992) [10], where three screens simultaneously depict a birth, a death, and a person floating underwater. Video art can also include abstract visuals or immersive landscapes, as seen in Frank Gillette's Aransas (1978), which used six video projectors to create a landscape experience [11]. Building on these possibilities, the researcher will use video as an artistic medium to explore and communicate the cultural narratives of the Patani state, deeply rooted in Islamic history and traditions. The contemporary patterns of the Talaa Gong will carry significant symbolic meaning, connected to the region's historical and cultural context.

In David Berger's Kant's Aesthetic Theory, the distinction between "beauty" and "agreeableness" emerges as a key theme in Kant's Critique of Judgment, particularly in the section Analytic of the Beautiful [12]. Baumgarten, deeply interested in the concept of beauty, compiled and developed knowledge on the subject, coining the term "aesthetics,"

derived from the Greek word "aisthetics," meaning sense perception. In Thai, the term is rendered as "Suntareeya Sat," or "aesthetics." Baumgarten's work laid the foundation for modern aesthetics, establishing it as an academic discipline. Drawing from these theories and the works of video artists, the researcher uses aesthetics as both a conceptual and methodological basis for the creative process, where an analytical and synthetic approach—alongside the region's context and the dimension of time—are essential to producing meaning [13].

2.1 The Introduction of Generative Artificial Intelligence (Generative AI or GenAI)

Generative AI refers to systems capable of generating text, images, or other media based on input data. Techniques like Variational Autoencoders (VAEs) are frequently used in generative tasks, particularly for generating high-resolution images inputs or even from textual descriptions. These models are key components of modern Large Language Models (LLMs), which leverage generative techniques to create highly coherent text and media outputs. Variational Autoencoders (VAEs) excel in tasks requiring the handling of complex and diverse data, effectively capturing the distribution of data in the latent space to generate diverse images with appropriate distributions [5]. Recently, numerous object detection methods have been introduced, driven by the widespread use of mobile devices and diverse application scenarios.

Researchers, such as Sanchez (2024) [5] and Ullah et al. (2024) [14], have explored the use of AI models like YOLOv8, which addresses accuracy in object detection by incorporating sophisticated feature extraction and prediction mechanisms. This has improved the performance of real-time detection tasks in applications such as image synthesis, where precise content generation is crucial [14].

3. Methodology

The research process commenced with the collection of data from documentary sources and fieldwork conducted in the three southern border provinces. The collected data was systematically analyzed to derive conclusions, which informed the creation of Talaa Gong patterns for printing on traditional Thai paper. These patterns were subsequently incorporated as a central component in the development of video art. The creative outputs were refined through consultations with subject matter experts and artists, and the finalized works were exhibited to the public. The research process was formally concluded with the compilation of findings into a comprehensive research report.

Concurrently, this research integrates advanced AI technology by adopting an experimental study design aimed at developing a recommendation model for image classification and retrieval using natural language, leveraging multi-model LLM. The methodology section provides a detailed account of the data collection and preprocessing procedures, the architecture of the model, the selection of hyperparameters, and the underlying rationale for these methodological choices.
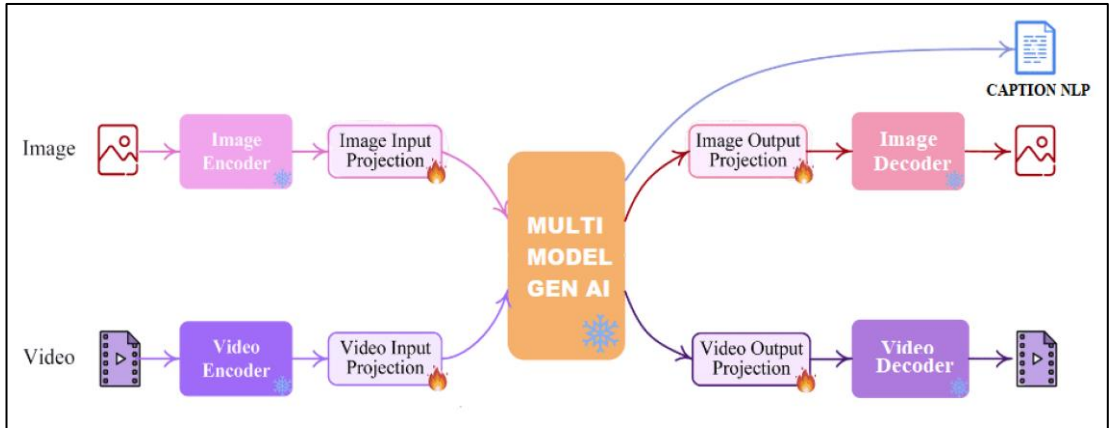
Figure 1 Structure of Multi-Model LLM Model

3.1 Datasets

The dataset, consisting of a video clip divided into three segments, was analyzed to trace the origins and migration of Islam to the Pattani, Yala, and Narathiwat provinces. This analysis was complemented by a detailed examination of violent unrest events from 2004 to 2023, along with a study of architectural patterns found in significant Islamic mosques, offering insights into the cultural and religious heritage of the area.

Segment 1: Long-distance shots to present a broad view for an initial "Small Narrative" that highlights the importance of water routes in the story of migration, where water plays a crucial role.
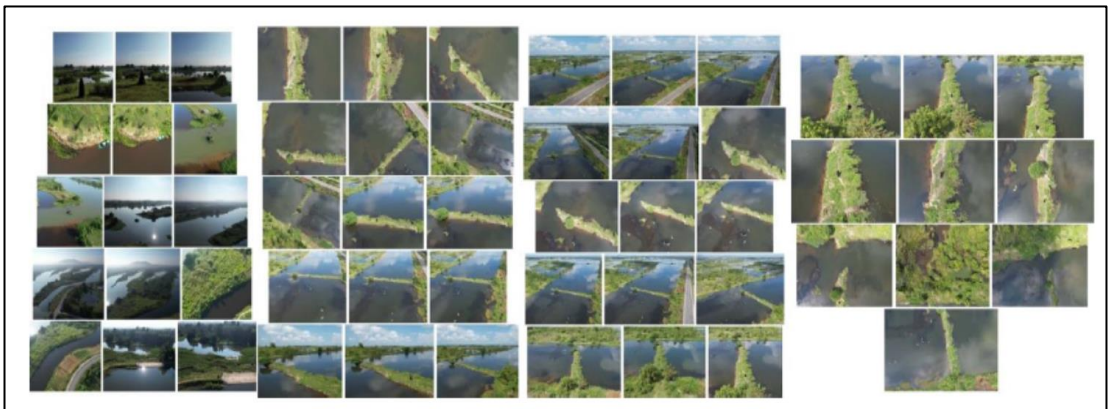

Figure 2 Long-distance shots to present a broad view for an initial "Small Narrative"

Segment 2: Medium-distance shots to transition into a closer dimension, featuring the female character and the Talaa Gong attire.

Figure 3 Medium-distance shots to transition into a closer dimension

Segment 3: Close-up shots of the Talaa Gong patterns, which have been crafted and created from used bullet casings, forming a narrative.
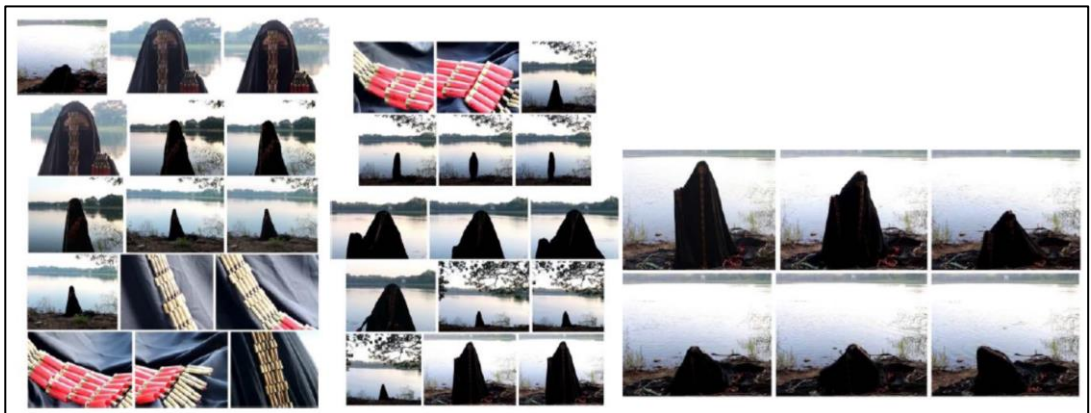

Figure 4 Close-up of Talaa Gong Patterns Crafted from Recycled Bullet Casings, Depicting a Cultural Narrative

By employing Generative AI and VAEs, the analysis extended beyond traditional methods, offering a data-driven exploration of the video clip. The AI-generated image captions added layers of interpretation, allowing for a richer understanding of the cultural and historical intricacies portrayed in the video. This process proved valuable in connecting visual motifs to their symbolic meanings, informing the researcher's own creative project focused on cultural narratives through both human and AI-generated interpretations.

3.2 VAE Model Architecture

The VAE model consists of two main components: the Encoder and the Decoder. The Encoder processes input images through convolutional layers, resulting in a latent space representation. The Decoder then reconstructs the image from this latent vector using deconvolutional layers, ultimately outputting the reconstructed image.
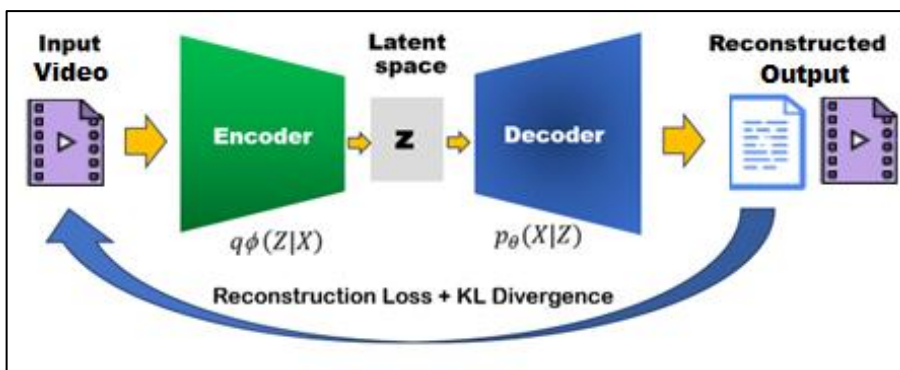

Figure 5 Structure of Variational Autoencoder (VAE) Model

3.2.1 Data Splitting:

The dataset was divided into training and testing sets in an 80/20 ratio. The training set was further split into an 80/20 ratio for training and validation purposes, ensuring that model performance could be monitored and adjusted throughout the training process.

3.2.2 Model Training:

The model was trained on an 80/20 train-test split, using a combined loss function of Reconstruction Loss (Mean Squared Error) and Kullback-Leibler (KL) Divergence. Training was conducted over 100 epochs, with key metrics such as loss, accuracy, and F1-Score recorded.

3.2.3 Model Evaluation

The model's performance was assessed using the following metrics [15]:

1. Accuracy: Proportion of correctly predicted labels out of all predictions.

$$\text{Accuracy} \quad = \quad \frac{\text{TP+TN}}{\text{TP+TN+FP+FN}} \tag{1}$$

2. Precision: Proportion of true positive predictions relative to the total positive predictions.

$$\text{Precision} = \frac{TP}{TP+FP} \tag{2}$$

3. Recall: Proportion of true positive predictions relative to all actual positives.

$$\text{Recall} = \frac{TP}{TP+FN} \tag{3}$$

4. F1-Score: Harmonic mean of precision and recall, providing a balanced measure of the model's accuracy.

$$\text{F1-Score} = 2 \times \frac{(\text{Precision x Recall})}{(\text{Precision+Recall})} \tag{4}$$

where:

TP : The number of instances where the model correctly predicted a positive outcome and the prediction matches the actual positive case in the test data.

TN : The number of instances where the model correctly predicted a negative outcome, and the prediction matches the actual negative case in the test data.

FP : The number of instances where the model incorrectly predicted

a positive outcome that does not match the actual negative case in the test data.

FN : The number of instances where the model incorrectly predicted

a negative outcome that does not match the actual positive case in the test data.

3.2.4 Query Vectorization: Used to evaluate the quality of generated image descriptions by comparing AI-generated descriptions against actual test set descriptions.

$$\text{cosine similarity} = \frac{A.B}{\|A\|.\|B\|} \tag{5}$$

where:

A and B – TF-IDF vectors of two texts

$A \cdot B$ – The dot product between the two vectors

$\|A\|.\|B\|$– The norm (magnitude) of each vector

4. Findings

The research examines the symbolic repurposing of bullets as part of a Talaa Gong set, representing and conveying the historical territorial conflicts in various regions, with a particular focus on the three southern border provinces. In this context, bullets are imbued with new meanings and functions. The design process involved a thorough analysis of traditional patterns derived from multiple sources, including painting, boat decoration, architectural elements, and textiles. These patterns were reimagined to create a Talaa Gong set that, while not intended for practical use, serves as a reflective medium engaging with the complex realities of the region.

The integration of VAEs in this research involved setting an appropriate train/test dataset sampling through an automated process. The dataset was processed using auto-generated sampling parameters to ensure balanced training and testing phases. This approach allowed the VAEs to detect and encode the visual and symbolic patterns embedded within the video, particularly focusing on the intricate Talaa Gong patterns and the evolving narrative. By automating the sampling process, the model effectively captured variations in the video, enabling accurate representation and retrieval of the symbolic elements associated with the historical and cultural context.
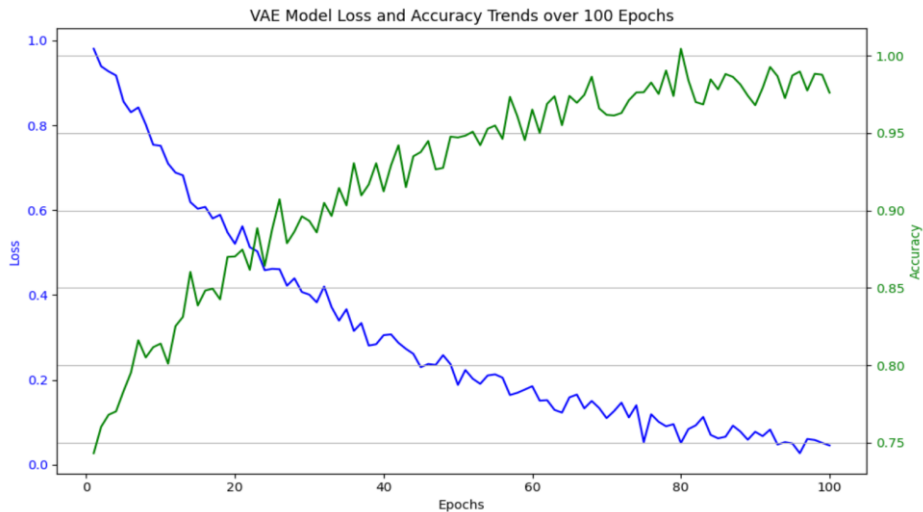

Figure 6 Model Loss and Accuracy Trends over 100 Epochs of Training

The Variational Autoencoder (VAE) model was tested on 2 video clips, consisting of 880 scenes snapshot for image processing. With 20% of the dataset used for evaluation, five experts compared AI predictions against true labels, identifying 496 true positives, 273 true negatives, 74 false positives, and 37 false negatives. The results show the VAE's strong performance in classifying most instances, but further improvements are needed to reduce the false positive rate for better accuracy.

The VAE model, illustrated in Figure. 3, achieves a precision of 87.02% in scene classification, effectively minimizing false positives. Its recall of 93.06% ensures that most positive cases are correctly identified, while the F1-Score of 89.94% reflects a balanced performance between precision and recall. With an overall accuracy of 87.39%, the model consistently classifies scenes from the video clips. Additionally, Table 2 demonstrates its ability to generate captions closely aligned with human-labeled data, with similarity scores ranging from 0.80 to 0.95, highlighting its practical potential in video and image processing applications.

This transition to video-based data with scene snapshots tests the VAE's capacity to process complex visual data across multiple frames, emphasizing its versatility in video analysis and image processing tasks.

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Confusion Matrix:
                  Predicted Positive  Predicted Negative
Actual Positive            496                   74
Actual Negative             37                  273

Performance Metrics Table:
       Metric                                       Formula   Value  \
0  Precision                                   TP / (TP + FP)  87.02%
1     Recall                                   TP / (TP + FN)  93.06%
2   Accuracy                 (TP + TN) / (TP + TN + FP + FN)  87.39%
3   F1-Score  2 * (Precision * Recall) / (Precision + Recall)  89.94%

                   Instances Involved
0                      TP: 496, FP: 74
1                      TP: 496, FN: 37
2   TP: 496, TN: 273, FP: 74, FN: 37
3              TP: 496, FP: 74, FN: 37
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Figure 7 Performance Metrics for VAE Model

Generative AI through Variational Autoencoders (VAEs) was applied to process the dataset, which includes a 9-minute video clip divided into three distinct segments.   The video begins with a high-angle view, providing a broad atmospheric perspective that offers a sense of depth and facilitates a stronger connection with the presentation and narrative journey. The story is centered around a female character wearing Talaa Gong (traditional Thai paper), with the narrative progressively transitioning to close-up shots of the intricate Talaa Gong patterns. The segments are broken down as follows:

Segment 1 features long-distance shots that present a broad view, introducing a "Small Narrative" that emphasizes the importance of water routes in the migration story. Water is depicted as a crucial element, symbolizing both the physical and cultural journeys of the people. This segment sets the stage for the narrative, highlighting how water shapes migration and connects the region's history with its current realities.

The Analysis of Segment 1

The imagery combined with the focus on Islamic history and the context of the Patani state, creates an opportunity to explore the deep interconnections between religious practices and cultural symbols, like the talaagong attire.

The long-distance water route shots from the image could represent the lifeline for the spread of Islamic culture and traditions, which crossed seas and rivers, linking different regions. In your narrative, this can serve as a metaphor for how Islam traveled from its origins to reach Southeast Asia, influencing the cultural and social landscape of Pattani, Yala, and Narathiwat.

The use of Islamic religious practices as a form of analysis to develop contemporary fabric patterns could be beautifully tied to the evolving identity of these provinces. The talaagong attire could symbolize a continuity of tradition, where ancient religious and cultural practices find modern expression through design.

In your small narrative, the rivers and water bodies could act as a symbol of fluidity, representing the flow of both people and ideas over time, shaping the cultural tapestry of

these provinces. The fabric patterns of talaagong attire, drawing inspiration from Islamic practices, can be positioned as a cultural artifact that bridges the historical and contemporary Islamic identity of the region.

Segment 2 transitions to medium-distance shots, bringing the viewer into a closer perspective. This segment focuses on the female character dressed in Talaa Gong attire, highlighting the intricate details of the traditional fabric. The shift in shot distance draws attention to both the character and the symbolism of the Talaa Gong, deepening the connection between the narrative and the cultural elements it represents.

The Analysis of Segment 2

The image contains a series of photographs featuring a person wearing traditional Islamic attire, set against natural outdoor backdrops, likely connected to the narrative of cultural heritage and migration. This visual combination can deepen the "Small Narrative" by connecting the personal and spiritual journeys of individuals to the broader context of migration and Islamic history in Southeast Asia.

The subject in traditional attire may represent a contemporary figure embodying the legacy of Islamic migration, symbolizing resilience, faith, and cultural continuity in the Patani state and surrounding areas. Here are some ways to incorporate these visuals into your narrative:

1.   Individual and Landscape Juxtaposition: The person standing by the water or nature can signify how individuals are shaped by the landscapes and historical routes traveled by their ancestors. The water bodies in the background connect directly to the theme of migration routes, while the attire reflects the enduring presence of Islamic culture.

2.   Cultural Continuity: The black attire and modest presentation align with Islamic principles, serving as a metaphor for how the faith has traveled and adapted while remaining true to its core practices. This could be tied to the fabric patterns mentioned in your previous narrative, showing the transition from spiritual to physical expressions (such as the talaagong attire).

3.   Historical Context and Personal Identity: By focusing on close-ups of the subject's face, the narrative can highlight personal identity and modern-day connections to historical Islamic migration. It can emphasize how the cultural and religious identity persists through generations, symbolized by the serene natural settings that have witnessed centuries of movement and change.

These elements can enrich your narrative on Islamic migration and cultural history, bridging the personal with the historical and symbolizing the continuation of tradition through generations.

Segment 3 features close-up shots of the Talaa Gong patterns, meticulously crafted from used bullet casings. These detailed shots emphasize the transformation of the casings into intricate designs, symbolizing the intersection of conflict and culture. The patterns form a narrative, conveying the historical and social complexities of the region, as the repurposed materials become both an artistic expression and a reflection of the region's past struggles and resilience.

The Analysis of Segment 3

The image you've uploaded shows a series of visual elements that include a person in traditional attire, focusing on close-up details and broader scenic shots, likely by a water source. These images seem to highlight cultural or symbolic aspects, potentially linked to a narrative of tradition and migration, with particular attention to fabric patterns or accessories.

In the context of the narrative we've discussed, these scenes can represent the blending of personal identity with broader historical and environmental contexts. The traditional attire, especially with close-ups of details like beads or fabric patterns, might reflect craftsmanship and cultural heritage. Meanwhile, the backdrop of the water can symbolize a connection to the migration routes that have shaped the identities of the people in the region.

If you're planning to use this for video or image processing within a VAE model, the focus on both personal details and environmental settings would serve well for generating meaningful visual representations, offering a balance between close and wide shots.

5. Discussion

The impact of the research on art and aesthetics has raised significant questions about the movement and living conditions of people in the area, especially as the video art was introduced to the public. This impact is not limited to reiterating existing perceptions or imposing certain limitations on outsiders; instead, it unveils a more complex and nuanced portrayal of the local way of life. Jean Baudrillard (1929–2007) [16], a notable French thinker in post-modernism, is renowned for his critiques of contemporary society and consumerism. His radical analytical approach, heavily influenced by Roland Barthes (1915–1980), a key structuralist known for his work on myths and signs, offers a lens through which to understand consumption in society. Baudrillard's early work critically examined and uncovered the underlying structures of consumer society, profoundly transforming our understanding of consumer culture through a semiotic approach to consumption. In this research, Baudrillard's theories have been instrumental in shaping the creation of video art centered on Cultural Semiotics. By applying his ideas, the researcher has delved into the exploration and presentation of cultural narratives and symbols embedded in the local context [17].

6. Conclusion

The creative works resulting from this research have established a network using a dataset deeply connected to Islamic history. Through expert analysis and recommendations, this dataset can be utilized, or parts of it can be synthesized into new creative works. This process represents an innovation that employs contemporary methods by decoding semiotic communications into images printed on Talaa Gong. These creations are also captured in recorded data through video, integrating aesthetics to heighten beauty derived from the researcher's experiences. This approach offers a fresh perspective on the people of the three southern border provinces, moving beyond the violence and unrest typically portrayed in news reports. The researcher envisions outcomes that reflect coordination mechanisms through art, viewing art as an innovation that can evolve from synthesized historical data.

The patterns emerging from storytelling, historical narratives, and migration can be extended into other creative fields, such as visual arts, literature, poetry, film, and documentaries.

Entities Utilizing Research Findings and Innovations

•	State Security Agencies in the Three Southern Border Provinces: These agencies can use the artwork to foster communication with society, promoting unity among local residents through art and patterns.

•	Community Organizations: They can leverage the research outputs to add value to local products by developing narratives that enhance their significance, thereby generating income for community enterprises.

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