



User Preference-Driven AIGC Design for Rural Tourism IP Images: A Case Study of Harbin

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Abstract. Rural tourism IP image design often suffers from visual homogeneity, weak cultural identification, and limited empirical support for visual element selection. Taking rural Harbin as a case, this study proposes a user-preference-driven AIGC design method that integrates perceptual-priority (PP) analysis, one-way ANOVA, and prompt engineering. Its methodological contribution is an evidence-translation mechanism that converts questionnaire-based user perception data into weighted prompt constraints for AIGC-assisted character design. Field investigation and a structured survey of 220 respondents were used to establish and evaluate ten Harbin rural cultural elements. PP analysis identified visually salient elements, while one-way ANOVA tested whether gender-based preference differences should inform balanced element weighting. The selected elements were converted into hierarchical prompts and compared with unweighted prompt outputs during Midjourney iteration, resulting in the rural tourism IP image "Ha-Bing". The workflow improves prompt traceability, strengthens cultural consistency, and provides a reproducible method for rural tourism IP image design and digital cultural communication.

Keywords: AIGC-assisted design; rural tourism IP image; perceptual priority; one-way ANOVA; prompt engineering; Harbin rural culture.

1 Introduction

Since the implementation of China's rural revitalization strategy, rural tourism has become an important carrier of regional economic development and cultural communication. Harbin possesses distinctive resources, including ice-snow culture, black-soil agriculture, Russian-style architecture, forest and wetland landscapes, and Northeast folk customs. However, many rural tourism brands still lack stable and recognizable IP images, and their visual communication remains fragmented across online and offline scenarios [5-7].

AIGC systems such as Midjourney can rapidly generate diverse visual outputs, but technical efficiency alone does not guarantee cultural accuracy, symbolic hierarchy, or user acceptance [1,3,4]. If prompts are constructed only from designers' subjective experience, the resulting IP images may be visually attractive but culturally ambiguous.

The core research issue is therefore how to transform user perception data into controllable AIGC design constraints.

To address this issue, this paper develops a preference-to-prompt design workflow. Its innovation is not the simple sequencing of PP, ANOVA, and Midjourney; rather, it establishes a translation logic that converts PP rankings and ANOVA-based segmentation results into structured prompt weights, visual priorities, and comparison criteria. PP identifies salient cultural elements, ANOVA checks whether preference differences require balanced weighting, and Midjourney implements evidence-informed image synthesis. The study therefore offers a reproducible link between user perception analysis and AIGC-assisted IP image generation.

2 Methodological Rationale and Framework

2.1 Why Perceptual Priority is Suitable for Harbin Rural IP Selection

Perceptual priority (PP) refers to the relative order and intensity with which users notice and prefer visual elements. It is suitable for Harbin rural IP element selection because Harbin rural culture contains heterogeneous symbols, including ice-snow landscapes, local food, farming tools, paper-cut ornaments, wooden houses, folk costumes, wetlands, farmland, and seasonal festival scenes. These elements differ in sensory immediacy, symbolic value, and applicability to character modeling, so they cannot be selected only by literature frequency or designer intuition. PP identifies elements with immediate visual salience and can be converted into prompt weights: high-PP elements define the main character identity, while lower-PP or scenario-oriented elements become props, backgrounds, or derivative application cues.

2.2 Why Gender is Tested by One-way ANOVA

Gender is not treated as the central or causal determinant of rural tourism preference. It is used as a basic segmentation variable to test whether young male and female respondents differ in their sensitivity to cute, colorful, natural, productive, or folk elements. One-way ANOVA, with gender as the grouping factor, is therefore used as a supplementary group-difference test. This diagnostic analysis avoids designing the IP image around a single undifferentiated average, while final element selection remains based on PP ranking, cultural representativeness, and design applicability.

2.3 Preference-to-Prompt AIGC Framework

The proposed framework consists of six linked steps: field investigation, element coding, PP screening, ANOVA-based segmentation checking, weighted prompt construction, and AIGC generation with design evaluation. Field investigation and literature analysis establish the cultural element pool; the questionnaire measures recognition, visual appeal, cultural representativeness, and IP applicability; PP identifies high-salience symbols; ANOVA checks possible group differences; and the results are

translated into a hierarchical prompt structure covering identity, cultural symbols, background, and style. Baseline unweighted prompts are retained for comparison, so user research becomes a direct input to AIGC design rather than a post-hoc explanation. The workflow is illustrated in Fig. 1.

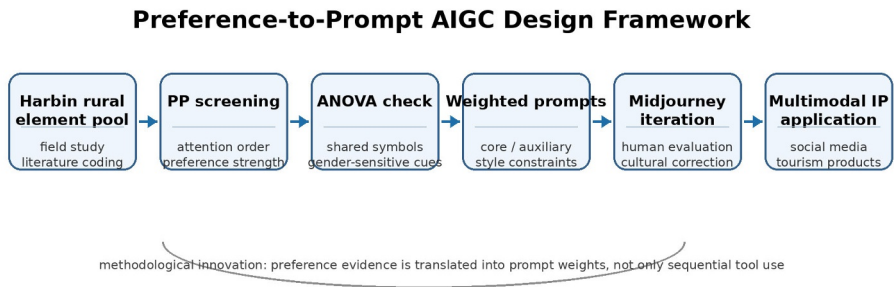


Fig. 1. Preference-to-prompt AIGC design framework for Harbin rural tourism IP image generation.

3 Cognitive Statistical Analysis of Harbin Rural Visual Elements

3.1 Survey Subjects and Element Pool

The survey adopted stratified convenience sampling among young users aged 18-30, an important audience for social-media communication and IP-based rural tourism consumption. A total of 220 questionnaires were distributed through three channels: central Harbin universities and youth communities, rural tourism contact points in Acheng, Shuangcheng, Hulan, and Wuchang, and Harbin-oriented online tourism communities. After excluding 15 incomplete or logically inconsistent responses, 205 valid questionnaires were retained. The valid sample included 82 central-urban respondents, 75 respondents recruited from suburban or county-level rural tourism contact points, and 48 online respondents with Harbin rural tourism awareness. Each cultural element was evaluated with a five-point Likert scale (1 = very low, 5 = very high) across four items: recognition, visual appeal, cultural representativeness, and IP applicability. Field investigation and literature analysis identified ten representative elements from natural landscapes, ice-snow culture, folk symbols, agricultural production, food memory, and architectural styles [2]. The respondent profile is summarized in Table 1.

Table 1. Demographic profile of respondents

Variable	Category	Number	Percentage (%)
Gender	Female / Male	107 / 98	52.2 / 47.8
Age	18-30	205	100.0
Education	College or university / Master's degree and above	175 / 30	85.4 / 14.6

Recruitment geography	Central Harbin / suburban rural tourism points / online Harbin tourism communities	82 / 75 / 48	40.0 / 36.6 / 23.4
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3.2 PP-ANOVA Results and Element Selection

The ten initially identified elements were retained in the questionnaire and then ranked by PP. Ice lantern and snow sculpture, black soil and farmland, paper-cut window grilles, corn cake and local food, winter fishing, and Russian-style wooden houses showed the strongest design relevance. Northeast folk costume, forest-wetland landscape, farm tools and granary, and rural festival scenes were retained as auxiliary resources for costume, background, and derivative application design. ANOVA indicated that female respondents showed relatively higher mean scores for cute, colorful, and warm elements, while male respondents showed relatively higher sensitivity to productive, ecological, and outdoor-rural elements. These findings do not lead to a gender-specific IP image; instead, they support a balanced design strategy that combines emotional appeal, regional authenticity, and scenario expression. The corresponding element decisions are summarized in Table 2.

Table 2. Ten cultural elements, questionnaire measurement scale, and design decision

Element	Questionnaire scale	PP/ANOVA interpretation	Design decision
E1 Black soil and farmland	R/A/C/I, 1-5 Likert	High PP; productive rural imagery	Black-soil overalls; harvest colors
E2 Ice lantern and snow sculpture	R/A/C/I, 1-5 Likert	Highest PP; slightly higher female mean	Ice-lantern hat; crystal texture; blue-white palette
E3 Paper-cut window grilles	R/A/C/I, 1-5 Likert	High PP; shared festive recognition	Red ornaments; lantern details
E4 Russian-style wooden house	R/A/C/I, 1-5 Likert	Place identity; background recognition	Wooden house; snowy village setting
E5 Northeast folk costume	R/A/C/I, 1-5 Likert	Auxiliary costume cue; warm/cute appeal	Cape, cuffs, and folk-pattern details
E6 Forest and wetland landscape	R/A/C/I, 1-5 Likert	Ecological cue; outdoor-rural sensitivity	Forest/wetland background extension
E7 Farm tools and granary	R/A/C/I, 1-5 Likert	Productive/harvest cue	Tool or granary icon for derivatives
E8 Rural festival and lantern scene	R/A/C/I, 1-5 Likert	Scenario-oriented cultural resource	Festival posters; lantern atmosphere
E9 Winter fishing	R/A/C/I, 1-5 Likert	Seasonal Northeast activity	Frozen lake; fishing tool; winter narrative
E10 Corn cake and local food	R/A/C/I, 1-5 Likert	High PP; warmth and memory cue	Corn-cake prop; food souvenir extension

4 AIGC Generation of Harbin Rural IP Image

4.1 Weighted Prompt Construction

Based on the PP and ANOVA results, the prompt was organized into three levels: main identity, cultural symbols, and scene/style constraints. The hierarchy reduces random stacking of regional elements and improves the controllability of AIGC output. To respond to the comparison requirement, an unweighted baseline prompt was first generated by listing the ten cultural elements without priority. Its outputs were then compared with the final weighted "Ha-Bing" attributes, so the design decision could be traced from empirical evidence to visual adjustment. The comparison results are summarized in Table 3.

Table 3. Comparative matrix of unweighted prompt outputs and final "Ha-Bing" visual attributes

Attribute	Initial un-weighted output	Final "Ha-Bing" attribute	Evidence-based adjustment
Identity	Generic winter mascot; unstable age and style	Rounded Harbin rural mascot with friendly expression	High PP and youth preference define main identity
Ice-snow symbol	Scattered snow and ice props without focus	Ice-lantern hat; crystal texture; blue-white palette	E2 set as primary visual symbol
Folk/agricultural cues	Overloaded rural props; weak hierarchy	Red paper-cut ornaments; black-soil overalls; corn-cake prop	E1, E3, and E10 weighted as secondary symbols
Scene and style	Generic snowy village; mixed 2D/realistic look	Wooden-house village, frozen-lake cue, blind-box 3D rendering	E4 and E9 used as scenario cues; style aligned with youth media preference

4.2 IP Generation, Iteration, and Multimodal Application

Midjourney V6 was used for image generation and iterative refinement [1,4]. The first stage generated baseline images from the unweighted prompt; these outputs helped identify problems such as element crowding, weak symbolic hierarchy, and inconsistent rendering style. The second stage introduced the weighted prompt, emphasizing the ice-snow identity and adding paper-cut ornaments, black-soil clothing, and corn-cake props as controlled secondary cues. The final stage optimized facial expression, color harmony, and style consistency. Designer-led evaluation checked cultural recognizability, aesthetic coherence, and suitability for rural tourism communication.



Fig. 2. Harbin rural tourism IP image "Ha-Bing" generated through PP-ANOVA-informed AIGC iteration.

The final IP image "Ha-Bing" integrates ice-snow culture, black-soil farming, folk ornamentation, local food memory, and rural hospitality without overloading the character form. Compared with the unweighted outputs, the final version presents a clearer primary symbol, more stable costume logic, and stronger scene association. Based on this image, multimodal applications can be developed for social stickers, souvenirs, guide interfaces, short-video communication, and educational activities. These applications extend the IP from a single character into a scalable brand communication system and improve social sharing and cultural tourism attractiveness. The final image is shown in Fig. 2.

5 Conclusion

This study proposes a user-preference-driven AIGC design method for rural tourism IP images by clarifying the methodological roles of PP, one-way ANOVA, and Midjourney. The revised workflow specifies the sampling method, recruitment geography, ten-element questionnaire scale, and baseline comparison procedure. PP ranks visually salient Harbin rural cultural elements, while ANOVA provides a supplementary segmentation check for possible preference differences. The main contribution is a preference-to-prompt mechanism that converts empirical perception data into structured AIGC prompt constraints.

The case study identifies ice lanterns, black soil and farmland, paper-cut window grilles, Russian-style wooden houses, Northeast folk costume, forest-wetland landscape, farm tools, rural festival scenes, winter fishing, and local food as the initial Harbin rural cultural element pool. The generated IP image "Ha-Bing" demonstrates that weighted prompts can improve cultural hierarchy and design traceability compared

with unweighted prompt outputs, while designer evaluation maintains cultural authenticity and visual coherence. Future research should expand the sample size, introduce post-generation user testing, and compare outputs across multiple AIGC platforms to verify the robustness and generalizability of the proposed method.

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