学 位 論 文 要 旨

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学位論文題目

Art Design Principle in Game Concept Art

学位論文の要旨

　　　This study places its primary emphasis on conducting a comprehensive analysis of the visual center and the intricate nuances of color combinations within the image of game concept art. The overarching objective is to discover the complexities of color utilization and its relationship with these creative game concept arts, thereby offering a profound and detailed analysis of the color combination in game concept art. By doing so, this research tries to analyze aspects of visual center and color combination for game concept art, ultimately providing a richer and more detailed understanding of the use of color in this specific genre of game concept art. Through this in-depth exploration, this study aims to uncover the underlying principles and design strategies that game concept artists use to attract audiences, thereby contributing valuable idea to the field of game art design.

　　　Firstly, two keywords in the study are explained. The first one is game concept art. Game concept art refers to the visual representations and illustrations created during the early stages of game development. It serves as a visual draft for the game, helping to convey the artistic vision, style, and overall design of the game. Concept artists create these images to depict characters, environments, objects, and other elements of the game world. Game concept art is crucial in shaping the look and feel of the entire game, guiding the development team and ensuring a cohesive and engaging visual experience for players. After explaining the definition of game concept art, this research mentions the differences between game concept art and the studies about the image processing. Game concept art has a more subjective approach than photos. In terms of color, game concept art can use more comprehensive colors to create the whole picture. Photographs, on the other hand, are closer to the color combinations we see in reality. Secondly, in terms of content, game concept art has a wider variety of themes than photos, including sci-fi, cartoon, dark and other art styles. They have totally different way to express the visual experience. It is precisely because of this unique characteristic that the conclusions of previous studies on photographs or image cannot be well applied to game concept art.

　　　Secondly the second keyword is visual center. Visual center refers to the quality of an image, design, or scene that captures and maintains a viewer's attention and curiosity. It is achieved through various visual elements, such as color, composition, contrast, texture, and object, which create a aesthetically visual experience. Visual center can make an image or design more engaging, dynamic, and memorable, drawing the audience's eye and encouraging them to explore and interact with the visual content. It is an important aspect of art, design, and photography, as it can evoke emotions, convey messages, and keep the viewer's attention. As a good game concept artist, desig

ning and utilizing the visual center is a basic ability. And a good game concept artwork has a good visual guide design and visual center design. The research related to this keyword is the study of saliency. However, most of the previous studies on saliency focus on the recognition of specific objects in images. On the other hand, most of the saliency research samples are also photo which is differ from game concept art. There fore, the method of saliency cannot be well applied to the game concept design drawings.

Then I separate my research in two stages. The first stage is to process the image to analyze the visual center of the game concept design diagram, and the second stage is to analyze the color of the visual center and non-visual center respectively, and summarize the rules.

my algorithm design idea is based on the idea of the game concept designer when designing the artwork. Usually when the game concept designer designs the game concept art. The area in the visual center will use stronger color contrast and richer color variations. But in the non-visual center area, the contrast will be weakened. The sky, for example, is mostly simply blue and white in the non-visual center. In the first section, we refer to the bags of color model and segment the image. Then for each local region, a hash algorithm is used to create color labels. And then the local region is classified. Thus similar local regions mean that the color combinations are single and similar, which means non-visual center regions. If the combination of colors is rich and unique in the image, it means that the region is visual center.

I compare this research method with the results of previous algorithms for similar studies of saliency. It can be seen that the results obtained are superior to the saliency algorithm. This is because the saliency algorithm focuses more on object recognition or analyzing pixel changes for the whole image. The innovation of our study is the concept of visual center, which is more commonly used in game concept art.

In the second part of the study, we began our analysis of color based on the first part of the study. First, we chose the HSV color space which is closer to human cognitive colors. On this basis, we created an approximate interval for each color. Then we counted the proportion of pixels occupied by each color in each local region. After analyzing all the charts, we summarized the pattern of color usage. We summarized the patterns into three main categories.

The study categorizes primary color combinations into "typical," "balanced," and "monochrome" and identifies a positive correlation between color contrast and the positioning of the visual center in game concept art. The methodology involves the use of the HSV color space, image segmentation, and meticulous analysis of color proportions within local regions. End of this stage, this research use colorization to show the application of this result.

The conclusions of these color combinations can be applied to the teaching of traditional painting and colorization, and can also create the foundation for our future research. While the research provides valuable insights into the use of color in game concept art, it acknowledges some limitations, such as potential misdetection in colorful and cartoon-style samples and segmentation errors. The study outlines future research directions, including refining the algorithm and exploring a broader range of factors influencing viewer attention in digital artwork.

In conclusion, this research advances the understanding of game concept art by offering a comprehensive analysis of visual centers and color combinations. We introduce novel methodologies to the specific needs of this genre, uncover the complexities and artistic choices within game concept art. The study hopes inspiring future research that will further enrich the field of game art and its interplay with technology.

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Applicant for degree ：

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Title of thesis ：

Art Design Principle in Game Concept Art

The study analyzes the visual center and color combinations within game concept art, aiming to uncover the intricate relationship between color use and creative expression in game concept art. It focuses on the subjective nature of game concept art compared to photos, highlighting the variety of themes and styles it encompasses. The significance of game concept art in shaping the overall game experience and its distinctiveness from the research of traditional image processing is apparent.

The concept of the visual center is key to the research, which captures and retains viewers' attention. This study aligns with game concept artists' perspective, emphasizing the role of strong color contrast and richness in visual center areas versus less contrast in non-visual areas.

The methodology involves utilizing the bags of color model, segmenting images, and using a hash algorithm to categorize the local region. This approach proves more effective than traditional saliency algorithms, contributing to a better understanding of the visual center. The subsequent analysis in the HSV color space uncovers three primary color combination patterns—typical, balanced, and monochrome—illustrating a positive link between color contrast and the positioning of the visual center in game concept art. This research compares the color combination result with existing colorization research. And it proves more effective than other colorization method.

However, the research acknowledges limitations, such as potential errors in colorful or cartoon-style samples and segmentation inaccuracies. This kind of factor cause misdetection. This research proposes refining algorithms and exploring additional factors influencing viewer attention in digital artwork for future investigations.

Overall, this study significantly contributes to presenting the principle of design in game concept art. It aims to inspire further exploration in the realm of game art and Colorization, providing valuable insights into color usage and visual design principles within this creative field.