Wall Color Visualizer

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***Abstract*—This MATLAB-based Wall Color Visualizer offers a user-friendly and interactive platform for individuals to experiment with different wall colors before making interior design decisions. Leveraging MATLAB's powerful image processing capabilities, users can upload room images or select templates to simulate the application of various colors on walls. The interface provides customization options for parameters like hue, saturation, and brightness, with real-time rendering enabling instant visualization of the effects on the overall ambiance. The system also integrates color palette suggestions based on design trends, catering to homeowners, interior designers, architects, and paint professionals alike. This project demonstrates the versatility of MATLAB in creating accessible and practical applications for visualizing and exploring wall colors in interior spaces.**

Keywords—wall color change, color specification, hue-based segmentation, FCN (Fully convolutional network)

I. Wall color visualizer

In the interior decoration, the color of the wall painting is crucial to the final effect. It can accentuate existing architectural details, add interest to a room as well, and reflect people's personalities directly. A color sets the mood for a room's interior and conveys how people want the space to feel. Usually, light colors like green, sunshine yellow, and tangerine are expansive and airy, making rooms seem larger and brighter. While dark colors like red, blue, and brown are sophisticated and warm; they give large rooms a more intimate appearance. Therefore, it's important to choose wall colors wisely when it comes to decorating. Nowadays, there is a large variety of colors for wall painting. In general, we may easily choose several candidate colors for the target room according to personal desires or the function of the room. However, it is difficult to determine which color fits best. Thus, our goal is to develop a system to perform wall painting automatically for indoor scene images, so that people can have a look at the room with preferred colored walls before making the last decision for painting.

The Wall Colour Visualizer design using MATLAB presents an innovative solution for individuals seeking an interactive and user-friendly tool to visualize and experiment with different wall colors before making interior design decisions. The proposed system leverages the powerful capabilities of MATLAB to create a seamless and intuitive platform that allows users to preview and compare various wall colors in a virtual environment.

The visualizer employs image processing techniques to accurately map and modify wall surfaces within a given room image. Users can upload their room images or choose from a predefined set of templates to simulate the application of different colors on the walls. The MATLAB interface provides a range of customization options, enabling users to adjust parameters such as hue, saturation, and brightness to achieve the desired visual effect

To enhance user experience, the visualizer incorporates real-time rendering, allowing users to see instantaneously how different color choices impact the overall ambiance of the room. Additionally, the system integrates color palette suggestions based on popular interior design trends, providing users with inspiration and guidance in selecting harmonious color schemes.

The MATLAB-based Wall Colour Visualizer not only serves as a practical tool for homeowners but also proves useful for interior designers, architects, and paint professionals. Its user-friendly design and robust functionality make it accessible to individuals with varying levels of technical expertise, democratizing the process of visualizing and experimenting with wall colors for interior spaces. This project showcases the potential of MATLAB in creating engaging and practical applications that bridge the gap between technology and everyday design challenges.

II. Literature survey

A. *Color detection using Pandas and Open CV*

In this method the CV database is introduced and according to it the number of shades that can be identified using 865 color names along with their RGB and hex values. Whenever the cursor clicks the image, it automatically shows the RGB shade's color values.[1]

B. *Magic Wall using Enhanced Wall Segmentation*

The system under discussion introduces a two-phase methodology for replacing wall colors in indoor scene images, with a primary goal of generating realistic and vibrant results. In the initial phase, the emphasis is on accurately extracting the semantic content associated with walls in the input image. To address this challenge, a novel approach is taken by incorporating an Edge-aware Fully Convolutional Network (Edge-aware-FCN) for parsing semantic content and an EnhancedNet to refine the details of the extracted regions. The combined framework, depicted in Fig. 1, illustrates the synergistic operation of these two networks. The Edge-aware-FCN adopts a joint learning strategy for edge detection and semantic prediction, utilizing edge-aware features to enhance the precision of semantic predictions. The process involves predicting edges by leveraging low-level features from the front layers and generating dense pixel-wise predictions from the last convolution layer, as showcased in the left portion of Fig. 1. Transitioning to the Enhanced-Net, additional front layers are utilized to refine further predictions obtained from the Edge-aware-FCN. This refinement process involves extracting the probability map for the wall from the Edge-aware-FCN and feeding it, along with the RGB image, into the Enhanced-Net. By leveraging these features, the Enhanced-Net produces a more polished and accurate prediction, thereby enhancing the overall efficacy of the system.

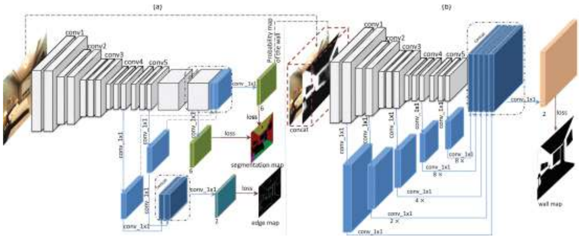

Figure 1 Overview of the proposed Edge-aware-FCN and Enhanced-Net for magic-wall. The framework mainly consists of two components. (a) Edge-aware-FCN. (b) Enhanced-Net. Given an image, it's first fed into the Edge-aware-FCN for a coarse probability map.

In the second phase, the focus shifts to executing a natural replacement for the wall regions obtained in the first phase. The argument is made that preserving brightness information is vital for ensuring the painted wall harmonizes with its background authentically. An illustration of this concept is the potential abruptness and inauthenticity in an indoor scene where only a lamp is depicted as illuminated without casting any light or shadow on the wall. To enhance the realism of the generated indoor scene image, a proposed approach involves employing a brightness-reserved strategy for replacement. This begins with the transformation of the RGB color space into HSV (hue, saturation, and value), where the luminance channel operates independently of the others. Subsequently, the entire replacement algorithm is implemented in the HSV color space to retain the luminance information of the source image. This approach contributes to a more authentic representation by considering the interplay of light and shadow in the painted wall within the context of the overall scene.

C. Color Swapping Techniques in Image Processing

Color Swapping simply refers to the idea of substituting a specific color(colors) in an image with some targeted color for exploration, design, image creation, etc.

In this method, the color is simply swapped by changing the hue, saturation, and value (HSV) on the applied mask. The mask is created of the object whose color is to be changed. But in this case, there is furniture and other items so the edge cannot be detected for every object and a proper mask cannot be created so this methodology does not work for wall color change.[2]

Figure 2 Original pen image

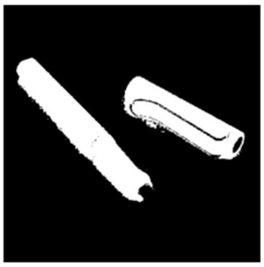

Figure 3 Color mask for the pen

Figure 4 Pen color changed with the same background

III. PROPOSED METHODOLOGY

With my proposed system, I have introduced an innovative hue saturation segmentation technique that utilizes MATLAB. This advanced approach allows users to change the colors of a wall while maintaining its unique patterns and shadows. The method is incredibly user-friendly, even for those with limited technical knowledge. By simply selecting the desired colors, my system will seamlessly change and visually display the new color scheme. With this new technology, users can achieve a personalized and professional-looking wall color transformation without the need for extensive training or experience.

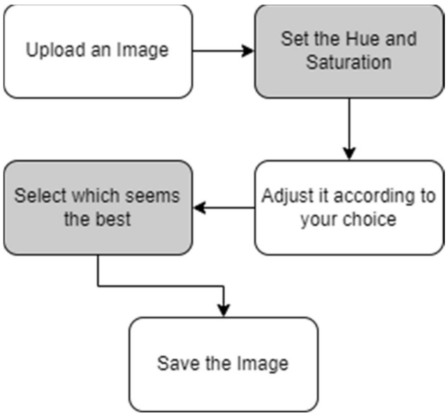

Figure 5 Flowchart of the proposed method

To begin with, the design takes the input image and breaks it down into its individual channels of Hue, Saturation, and Value (HSV). The Hue and Saturation channels are responsible for controlling the color and shade of the wall, while the Value channel determines the brightness. Since the algorithm is not significantly impacted by brightness, our focus is on the Hue and Saturation channels.

For accurate results, the wall should occupy a significant portion of the image, allowing us to calculate the mean of the Hue and Saturation channel intensities. The mean value obtained has a variance that encompasses both light and dark shades of the primary color in the image. This range of intensities can be transformed using the color selected by the user in the GUI. The user's chosen color is the factor by which the Hue channel is transformed.

In summary, the algorithm uses the Hue and Saturation channels of an input image to calculate the mean of the intensities. This calculation is based on the primary color of the wall, and the resulting range of intensities can be transformed using a color selected by the user in the GUI.

IV. Results

The wall color visualizer is shown in Figure 6-9. In Figure 7, we can see that the product of the factor and the original Hue replaces the maximum area covered by the values of Hue. Figure 8 shows the color-transformed HSV image. It is noticeable that the hue of the wall that covers the maximum area has changed. Finally, Figure 9 displays the RGB output, which is the final result.

Figure 6 Input Wall image

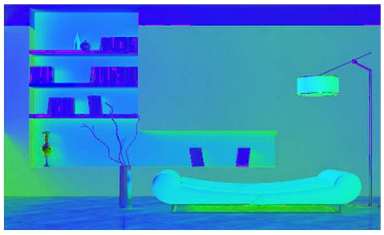

Figure 7 HSV representation (w/o transformation)

Figure 8 HSV representation (with transformation)

Figure 9 Output image

V. Conclusion

In conclusion, this project successfully demonstrates how a Hue-Saturation transformation approach implemented in MATLAB can effectively and feasibly change wall colors in indoor settings. The proposed method is simple and efficient, making it a valuable tool for users who want to visualize and experiment with different wall colors in a virtual environment. The project takes advantage of the inherent capabilities of MATLAB, allowing for seamless and intuitive manipulation of hue and saturation parameters, which makes exploring various color schemes straightforward. The project is user-friendly and accessible to a wide audience, from homeowners to interior designers. The visual results demonstrate the potential of this approach to facilitate informed decision-making in interior design by providing a quick and realistic preview of the impact of different color choices. As a practical and user-centered tool, the MATLAB-based wall color change project is a valuable resource for those who want to transform and personalize their living space.

VI. Acknowledgment

I want to express my heartfelt gratitude to all my batchmates who have contributed to the successful completion of the Wall Colour Visualizer project, which is based on MATLAB. The unwavering support and guidance of Dr. Ruchi Gajjar were instrumental in shaping the project, and her expertise and encouragement played a vital role in

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VII. References

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