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Color Harmony: Improving Color Uniformity in Multiple Images by Considering Contrast

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ABSTRACT:

Finding near-duplicate photos is essential for identifying forged images, especially when the original images have undergone minute changes. A lot of study has gone into creating effective picture similarity metrics and signatures to meet the demands of different visual applications. It is now simple to alter and manipulate photos because to the widespread use of sophisticated image processing tools. As such, there is an important problem that needs to be solved: finding near-duplicate photos with little changes. This problem is known as near-duplicate image detection.Image recoloring is a well-known image alteration method that can be used to change an image's color or theme without the viewer noticing the changes. Interestingly, for all the importance of image recoloring as a tool for image manipulation, there are surprisingly few specialist approaches available to identify this particular kind of forgeries. As a reaction, this study presents a novel and trainable end-to-end system that can differentiate recolored images from their original form. By using a convolutional neural network (CNN) architecture, the system considers two extra inputs: illumination consistency and inter-channel correlation.

1.INTRODUCTION:

Maintaining the validity and integrity of digital photographs depends critically on the crucial task of identifying near-duplicate images, especially those that have been slightly altered. It is more important than ever to be able to tell the difference between real and fake information in an increasingly digital environment full of visuals. In this process, the technique of near-duplicate picture identification turns into a vital tool that helps us identify manipulated photographs, find unapproved edits, and preserve the reliability of visual content.With the development of powerful image processing tools, anyone may now manipulate images. This increased power makes it simple to change, recolor, or edit digital photos, which puts existing approaches to authenticity verification to the test. Thus, we are confronted with the difficult task of recognizing images that have subtle but significant differences from their original forms—a task that is often referred to as "near-duplicate image detection."

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Fig 1.Color Consistency Correction based on remapping optimization

The goal of this research is to overcome this difficulty by examining and creating efficient methods for identifying nearly-duplicate photos that have undergone minor modifications. These adjustments, which are frequently undetectable to the naked eye, could entail modifications to color, contrast, or theme components. The capacity to identify such minute alterations is extremely significant in a number of contexts, ranging from guaranteeing the correctness of digital evidence in court cases to maintaining the legitimacy of photos used in scientific investigations. Within this context, image recoloring has become a popular method for gradually changing the color or topic of an image. As important as it is, there aren't many specialist techniques available right now to identify this particular type of fake.

2.LITERATURE REVIEW:

2.1 INTRODUCTION:

Seamless Image Stitching is the process of combining multiple overlapping images into a composite image. The quality of image stitching is evaluated based on the similarity to the input images and the visibility of the seams between them .In The process of producing panorama [1], [2], digital orthophoto map (DOM) [3], and textured three-dimensional (3-D) model [4]–[6], we usually need to mosaic several images into a large image as seamlessly as possible. However, there usually are drastic color discrepancies between input images if they are captured by different sensors or at different times. The color inconsistency seriously degrades the visual quality of composite image and textured 3-D model. To solve this problem, we usually apply the image blending [7]–[9] methods to smooth the color differences between adjacent images. However, image blending can only eliminate the local and small color discrepancies, and it may fail when the color differences are global and drastic. Thus, it is necessary to perform color consistency correction for multiple images to ensure that the drastic and global color discrepancies have been eliminated before image mosaicking and texture mapping. Otherwise, the color artifacts will appear on the composite image and textured 3-D model. In this article, we focus on color consistency correction for multiview image mosaicking. It should be noted that the proposed approach can be used for another applications, too.

In recent years, many advanced color consistency correction approaches in the fields of remote sensing [10] and computer vision [11] have been proposed to eliminate drastic color discrepancies. Most of these approaches focus on how to extract the robust color correspondences and how to design the optimal color model and energy function. In most cases, existing approaches can effectively correct color differences and obtain corrected images with global consistent tones.

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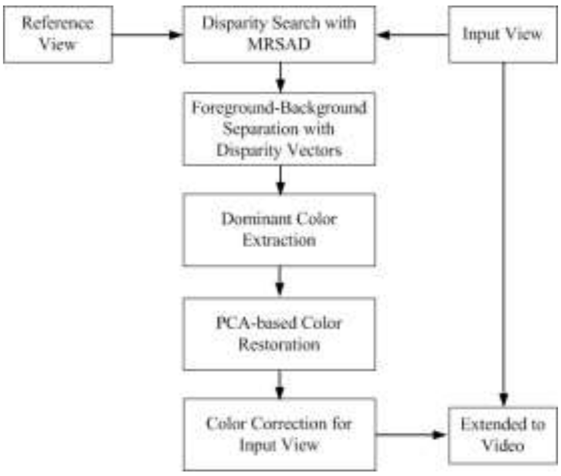
However, their correcting results may not be visually pleasing. Because sometimes the contrast of the corrected images is low, which significantly degrades the visual quality. To visually illustrate this issue, we present an example in Fig. 1. The color discrepancies between input images are large and the contrast of each individual image is low, as shown in Fig. 1(a). We present the corrected images generated by two existing approaches [12], [13] in Fig. 1(b) and (c), respectively. Although the images presented in Fig. 1(b) and (c) have consistent global tones, the composite images are still unpleasant because the contrast of corrected images is still low. The scores of color distance (CD) and measure of enhancement (EME) presented in Fig. 1 also support the above conclusion. The definitions of CD and EME can be found in Section V-A.

3.BLOCK DIAGRAM:



3.1 COMPONENTS:

- **Processor : Pentium IV :**

  The processor prerequisites for a system designed to address color consistency issues in multiple images are contingent on multiple variables. These include the complexity of the correction algorithms, the image resolutions being processed, and the desired processing speed

Fig 3.1.1 represents processor platinum IV

- **RAM 256MB:**

  A system with 256MB of RAM is inadequate for efficient color consistency correction on multiple images. Limited RAM leads to slow processing, potential crashes, and degraded correction quality, especially with high-resolution images or batch processing.

Fig 3.1.2 represents RAM memory 256MB

- **HardDisk:minimum512MB:**

  The 512MB hard disk space requirement is the minimum needed for software installation and basic operation of color consistency correction. However, additional space is necessary for

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temporary data storage, backup copies of images, and efficient handling of multiple high-resolution images. To ensure practical use and performance, having more hard disk space is advisable.

Fig 3.1.3 represents hard disk of minimum 512 MB

4.DESIGN FLOW :

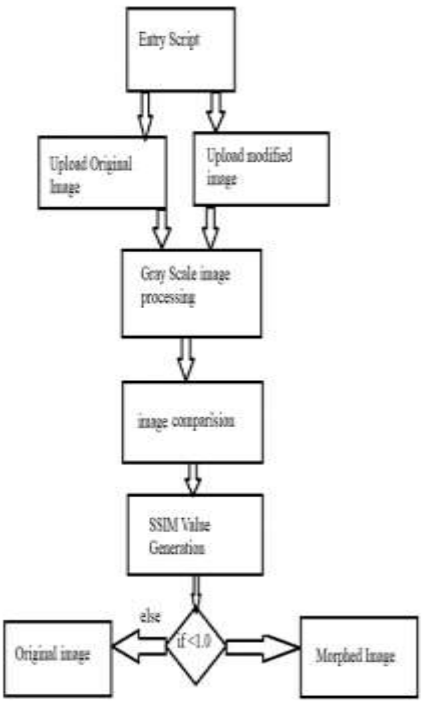

Fig 4.1 represents the design flow

- The user's upload of the pictures.
- Of the two photos, one is the original and the other has been altered.
- A grayscale image will be created from those two pictures.
- The comparison will be carried out following the processing of the two photos.
- By contrasting the edited and original pictures. Processing of the Measurement will occur.
- The creation of the SSIM (Structural Similarity Index Measure) value, which compares the two images' index values.
- An image is morphed if the index value is larger than 1.0; an original image is present if the index value is less than 1.0

5.WORKING:

Multi-image contrast-aware color consistency correction is a sophisticated and challenging image processing method. It starts with an initial set of input photographs that frequently have inconsistent color due to different lighting, different white balance settings, or other issues. The photos go through preprocessing, which entails normalizing their properties, to resolve these disparities. This could entail fixing the white balance, decreasing noise, and scaling the photos to a standard resolution. The preprocessing stage makes sure the photos are ready for color correction.

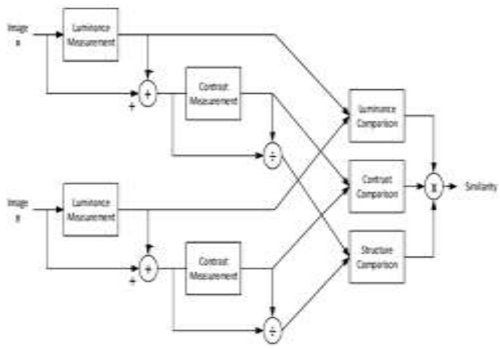

Fig 5.1: represents a brief idea on verifying a original image

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Following preprocessing, the system uses algorithms to identify differences in visual contrast between the input images. This is a crucial stage because it enables the system to recognize the variations in contrast between the images and where they occur. To find areas with notable contrast discrepancies, one can employ statistical techniques, picture histogram analysis, or local contrast measurements. This data forms the basis for a contrast-sensitive color correcting procedure.

In order to achieve color uniformity among the various photos, the color channels, brightness, saturation, and contrast are adjusted during the color correcting process. The capacity of contrast-aware color correction to modify the correction settings in response to previously identified contrast variations is what distinguishes it. Put another way, the system modifies the color correction based on the varying contrast levels in different areas of the photos. This produces a series of adjusted photos that take into account the differences in contrast between the source images and show better color constancy.

If necessary, users may also choose to manually adjust the correction; additionally, batch processing is supported by the system to enable effective correction of huge image datasets. The process is made more successful overall by thorough validation, optimization, and user guiding, which guarantee aesthetically beautiful and cohesive output.

6.RESULTS:

A set of photographs that have been altered to repair color inconsistencies while taking contrast variations into account are the end result of contrast-aware color consistency correction for multiple images. The main goal is to produce a collection of photos that are harmoniously and cohesively rendered, with a uniform color scheme and overall design. Through the adjustment of color channels, brightness, saturation, and contrast, color properties throughout the photos are harmonized, improving their visual appeal and appropriateness for a unified presentation or analysis.

The efficacy of the correction algorithms and the system's capacity to precisely identify contrast variations among the input photos determine the final product's quality. Furthermore, the final result may differ depending on how much the user can adjust or manage the corrective process. The goal of the output is to improve the visual quality and consistency of the images so that they can be used in a wider range of applications, such as design, medical imaging, photography, and more.

Apart from the immediate outcomes, the project also has a lasting influence since it provides insightful information on the topic of contrast-aware color consistency correction for many photos. It points to possible lines of inquiry,

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such as ways to improve algorithms, investigate novel uses, and address particular problems. The project's incorporation of ethical and legal issues guarantees adherence to prescribed protocols. Additionally, the project encourages accessibility by giving participants the choice to disseminate its results to a larger audience. This entails the distribution of code, datasets, and research results to the larger research community, enhancing the body of knowledge in the area and encouraging teamwork. The project's overall results highlight its noteworthy contributions to improving image quality and color consistency in the context of several images.

CONCLUSION:

In conclusion, this project represents contrast-aware color consistency correction for numerous images is an advanced and vital image processing tool. It corrects color inconsistencies that frequently occur from different lighting, differences in white balance, or other elements in a collection of photos. It goes beyond simple color correction to take into account variations in image contrast throughout the dataset by implementing contrast-aware algorithms.

Preprocessing is the first step in the process, which standardizes image attributes. Contrast detection and color correction come next. As a result, despite the early variances, the set of photos has better color uniformity, making them look more aesthetically pleasing and consistent. This improvement is notably important for a variety of disciplines where preserving consistent and precise visual data is essential, such as medical imaging, photography, and design. The effectiveness of the correction process is contingent upon the algorithms' precision and efficiency as well as the system's capacity to adjust for differences in contrast. Contrast-aware color consistency correction is still essential for enhancing image quality and guaranteeing the consistency of visual presentations, even with the advancement of technology.

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