CameraSHOT

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Abstract

CameraSHOT is simple and effective application software that aims to work upon or alter the theme/color-scheme of an image. The application is inspired by Window's adaptive theme feature that automatically picks an accent color from the desktop background for Start, taskbar, action center, and title bar. CameraSHOT, however, analyses the image's pre-existing theme/color-scheme and alters it with almost zero assistance from the user. A detailed description of the software CameraSHOT has been presented in this work. The basic principle behind the software rests in analysing an image and altering its theme or color scheme.

1. Introduction

There are billions of free wallpapers available on the internet. Yet, one may sometimes feel the need of altering the theme/color-scheme of an image [1][2]. Theme alteration is not just changing the image background, rather theme alteration refers to changing the color scheme of an image from its root, from every pixel, to maintain the original components, details, and quality. Theme alteration is a subset of image editing, thus, theme alteration is possible with a good image editing software like, Adobe Photoshop [3], but usually, it is time-consuming, as the image editing software generally do not provide much assistance or the required environment particularly to work

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upon image's color scheme. Rather, the user has to do most of the work manually, which is again time-consuming and not convenient for the users.
One good implementation of theme alteration can be explained using a simple real-life experience. For two images, taken in outdoor, from the same point and the same angle, at two different points in time in a particular day, say, around morning and evening will only differ by its theme. The image taken around the morning will have a bluish sky with a yellowish shade and will be highly bright. The image taken in the evening, however, will have a reddish sky with orangish shade, will be comparatively dull. With a theme editing software like CameraSHOT, the former image can be converted into the latter one, and vice-versa, with just a few clicks.
CameraSHOT has proved to be a simple, button-based, click-to-go mechanism-based software, which allows its users to do an incredible alteration to an image with few mouse-clicks. CameraSHOT comes pre-packed with the features like scheme priority alteration, scheme swap, scheme casting, etc. Every kind of theme alteration is possible with these tools. CameraSHOT does not expect its user to have any prior knowledge of tools and the user interface of the software is very minimalistic and self-explanatory. CameraSHOT requires zero dependencies and is the perfect tool for alternating the theme of a jpeg/jpg image.

2. Proposed Software

As earlier stated, CameraSHOT aims to alter the theme/color-scheme of an image with operations like scheme alteration, scheme casting and scheme swap. CameraSHOT smartly analyses the image and recognizes its existing scheme, then tries to alter the same with almost no assistance from the user. The foundation of CameraSHOT is based upon the color quantization [4][5], with which it smartly recognizes and keeps track of the dominant colors of the image [6]. With this data, CameraSHOT attempts to alter the color-scheme of a jpeg/jpg image while preserving the existing details, image quality, resolution and aspect ratio. CameraSHOT also provides the tools for enhancing the image by improving the image's properties [6][7]. The details of the operations that can be performed upon an image are listed below.

- **Scheme Swap** - There are three alternative scheme swaps settings available. The application allows a user to swap the core color scheme

of the image between red & blue; blue & green; and red & green. Scheme swap is achieved by juggling the strength of Red, Green and Blue properties of individual pixels. Scheme swap preserves the original scheme, thus scheme swap can be nullified by applying the exact operation twice.

- **Scheme Priority** - There are six alternative scheme priority settings available. The application allows the user to assign priority to the core colors. Setting priority means that the color component with the highest priority will appear the most (quantitative [4] and qualitatively both [7]), and the component with the least priority will appear the least. Scheme Priority can be considered as a smart Scheme Swap. The application is smart enough to detect the current scheme priority, and thus, can easily be used to change the priorities.

- **Scheme Cast** - There are six alternative settings available for scheme cast. Scheme cast allows the user to cast the scheme of a particular color component to some other color component. On pixel level, it is achieved by casting the strength [8] of a color component (say Blue) to some other color component (Red or Green).

- **Color Component Enhancement** - This feature allows the user to increase or decrease or enhance [7][8] the strength of a color component independently. In technical terms, this setting boosts the strength of a particular color component.

- **Other Operations** - Other features include improvement in Brightness, Sharpness, and Contrast, each of which is independent. These settings are achieved by in-built functions of Python Pillow Library.

Every operation of the application is independent, thus, no two operations will affect each other. A user can have the software in a local machine and can work upon the images and save them locally. Once the user is satisfied with the sample output (which is displayed in real-time), the user can save the changes and download a copy of the image, directly into the download folder with a single click.
The application is written in Python3 and uses Flask_1.1.2 in the backend. Flask is a micro web framework written in Python. It is classified as a micro-framework because it does not require particular tools or libraries.

Flask supports extensions that can add application features as if they were implemented in Flask itself. Extensions exist for object-relational mappers, form validation, and upload handling, various open authentication technologies, and several common framework related tools. The application also uses flaskwebgui which uses threading to start a flask server and the browser in-app mode (for chrome). The advantage of flaskwebgui is in two folds, one, with flaskwebgui, the user interface can be designed and coded in HTML, CSS, and JavaScript. Two, it gives a feel to the user that he/she is using a normal application, rather than a web application. The user interface is designed using HTML5 and CSS3 and uses Bootstrap_4.3. The User Interface design is simplistic and feels calm, giving the user a perfect environment for working. The application requires absolutely zero dependencies, as it is converted to an executable file using pyinstaller. PyInstaller freezes (packages) Python applications into stand-alone executable, under Windows, GNU/Linux, Mac OS X, FreeBSD, Solaris, and AIX.
The user interface(UI) of CameraSHOT is shown in Figure 1. The UI is simple and accommodates three alternative settings for Scheme Swap, six alternative settings for Scheme Priority and Scheme Cast respectively, and Image Enhancement handles, all in one screen. A user can apply each setting individually, or compositely, and apply them to the image using the OPERATE button. There is a dedicated section for displaying the sample output in real-time. Once the user is satisfied with the sample output, the user can save the changes and download a copy of the image, directly into the download folder with the DOWNLOAD button.

3. Comparative study with the existing Software

A good number of reputed image editing software like Adobe Photoshop [3], GIMP [9], Krita, etc. are available in today's date. But none of them aims directly to theme alteration Moreover, most of the professional photo editing software is proprietary and expects prior knowledge of tools, layers, etc. from its users. CameraSHOT is user-friendly, machine-friendly, and light-weight application software that aims directly at theme alterations [6][7][8] of an image with a professional/ semi-professional finish. CameraSHOT is fast, robust, and reliable, which makes it a perfect theme alteration software. Its user interface is simple, calm, and perfect for personal and professional use.
The result of theme alteration over the image Fish-Alone-Underwater [10] is

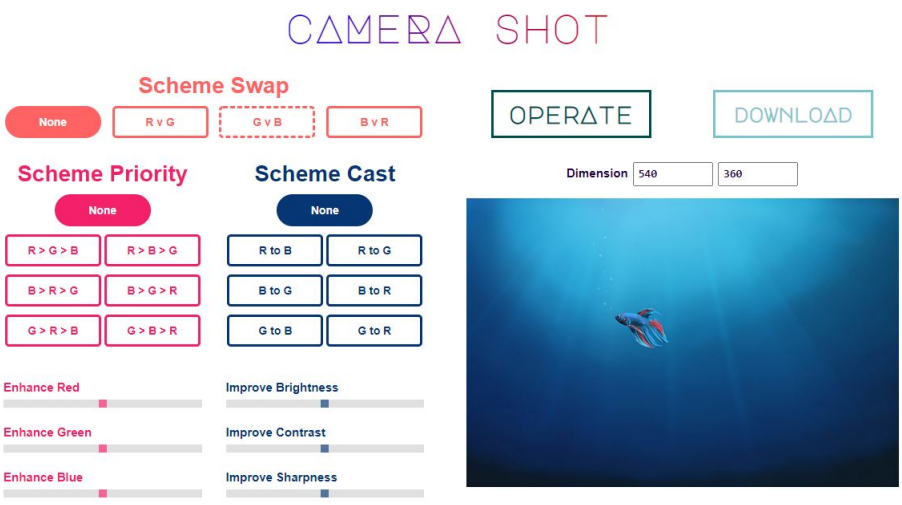
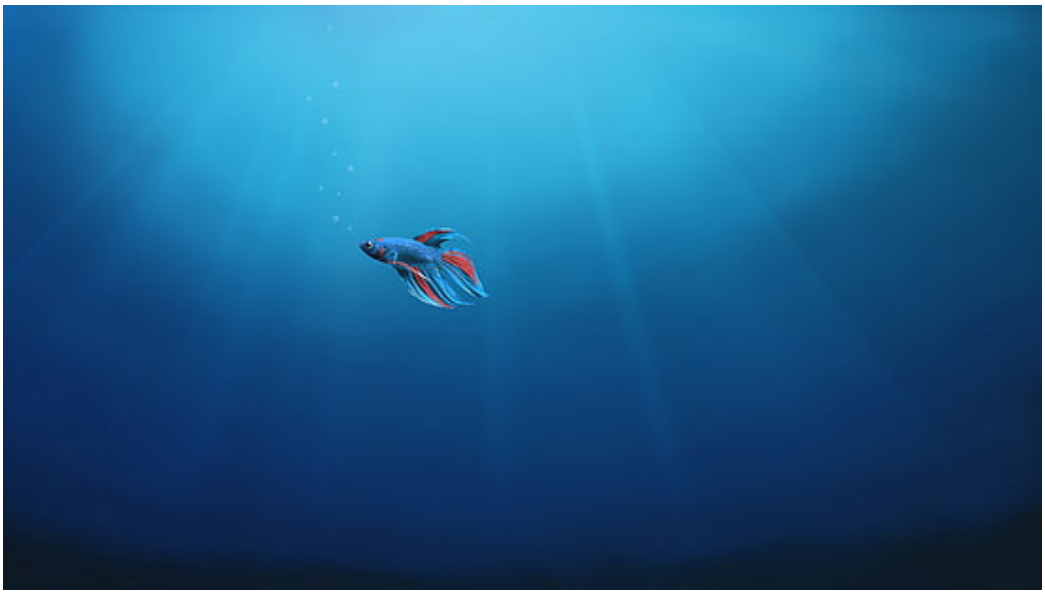
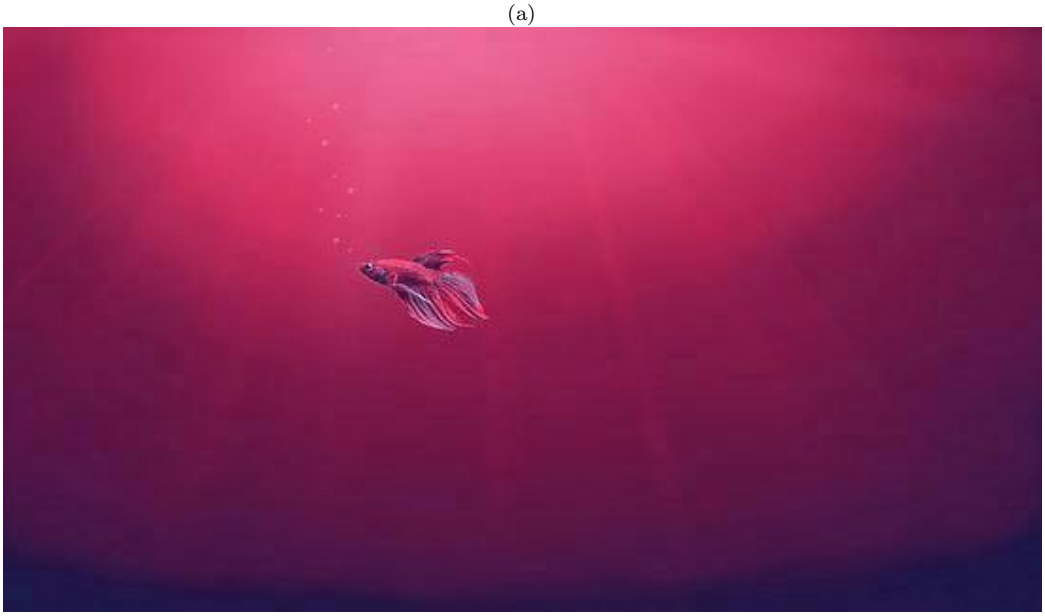


Figure 1: . User Interface of CameraSHOT

presented in Figure 2. Figure 2a is the original image, where the theme is blue, or bluish. Fig 2b is the resultant image after theme alteration to red, or reddish.



(a)



(b)

Figure 2: (a)Original Image (Theme : Blue) and (b) Operated Image (Theme : Red)

4. Discussions and Conclusion

Application software that aims particularly at altering the theme of an image/wallpaper is proposed in this work. The application also aims to provide a professional/semi-professional finish in just a few mouse-clicks. CameraSHOT is a reliable and easy-to-use software that can alter the color scheme of a jpeg/jpg image with almost zero assistance from the user. It comes packed with a wide variety of combinations of operations. The simplistic user interface and wide range of operations make CameraSHOT a perfect theme alteration application for professional or personal use.

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