

## **Improved GCC technique: a comprehensive approach to color Cast rectification and image enhancement**

### **ABSTRACT**

The domain of underwater imaging is riddled with multifarious challenges, such as light attenuation, scattering, and color distortion, which can have a detrimental impact on the quality of images. In order to address these challenges, the Generalized Color Compensation (GCC) technique has been introduced, which utilizes color compensation and color mean adjustment to rectify color cast while integrating contrast enhancement via the Contrast Limited Adaptive Histogram Equalization (CLAHE). Nevertheless, the performance of GCC is limited due to the production of bright and smooth images. To overcome this challenge, we have introduced the improved GCC approach, which employs color compensation and color mean adjustment to rectify color cast. Subsequently, a contrast-enhanced image is generated through CLAHE to improve image contrast, while the detail-enhanced image is produced via a cumulative distribution function. Furthermore, image fusion between the detail-enhanced and contrast-enhanced images yields a superior-quality image. Our experimental results demonstrate the effectiveness of our proposed technique in improving the visual quality of underwater images. Objective metrics such as Underwater Image Quality Measure (UIQM) demonstrate that our technique surpasses GCC in terms of image sharpness, colorfulness, and contrast.