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Short Communication

Obstacles Associated with Image Processing Advancement

Rebecca Smith*

Editorial Office, International Journal of Advancements in Technology, Spain

ABSTRACT

For decades, the topic of image processing has been the focus of intense research and development efforts. Image/video processing, image/video analysis, image/video communications, image/video sensing, modeling and representation, computational imaging, electronic imaging, information forensics, and security, 3D imaging, medical imaging, and machine learning applied to these topics are all covered under this umbrella term. Following that, we'll look at image and video material (i.e. a sequence of images), as well as all types of visual information in general. Many outstanding and successful applications have resulted from rapid technical advancements, particularly in terms of processing power and network transmission bandwidth. Images are now pervasive in our daily lives. Digital TV (e.g., broadcast, cable, and satellite TV), Internet video streaming, digital cinema, and video games are examples of applications that have profited substantially. Imaging technologies are used in a wide range of applications, including digital photography, video conferencing, video monitoring and surveillance, and satellite imaging, as well as in more distant domains like healthcare and medicine, distance learning, digital archiving, cultural heritage, and the automotive industry.

INTRODUCTION

The human visual system can see a wide range of luminous intensities, from very bright to very dark, employing various adaptation mechanisms, as seen in the real world. Nonetheless, present imaging technologies are limited in their ability to capture or portray such a diverse set of situations. The goal of High Dynamic Range (HDR) imaging is to address this problem. Wide Color Gamut (WCG) is frequently used in conjunction with HDR to provide wider calorimetry. In the domain of photography, HDR has attained a certain level of maturity. Extending HDR to video sequences, on the other hand, poses scientific problems in terms of delivering high-quality, cost-effective solutions, with implications for the entire imaging processing pipeline, including content gathering, tone reproduction, color management, coding, and display. Another concern is backward compatibility with legacy content and traditional systems. Despite recent advances, HDR's full potential has yet to be realized. The hybrid video coding scheme based on the principles of transform coding and predictive coding has been progressively refined during three decades of standardization operations. When compared to its predecessor, High-Efficiency Video Coding (HEVC), the Versatile Video Coding (VVC) standard was finalized in 2020, delivering a 50% bit rate reduction for the same subjective quality (HEVC). While significantly exceeding VVC in the immediate term may be problematic, relying on enhanced perceptual models to further optimize compression in terms of visual quality is an intriguing trend. Another path that has already yielded promising results is to use deep learning-based techniques. One important challenge here is the capacity to apply these deep models to a wide range of video sources. The second major difficulty is implementation complexity, which is a considerable barrier to wider adoption in terms of compute and memory requirements.

It's critical to create good human perception models. On the one hand, it can aid in the creation of perceptually inspired algorithms. Perceptual quality assessment approaches, on the other hand, are required to optimize and evaluate new imaging technologies. Image aesthetic evaluation is another closely connected topic. Numerous aspects, such as lighting, color, contrast, and composition, influence the aesthetic quality of an image. It can be used in a variety of situations, including picture retrieval and rating, recommendation, and photo enhancement. While earlier attempts to predict aesthetic quality relied on handcrafted features, more recent systems are data-driven and based on deep learning algorithms, taking advantage of the availability of massive annotated datasets for training. The goal of quickly analyzing, interpreting, and understanding visual data is another prominent study direction. Due to the enormous diversity and complexity of visual data, this goal is difficult to achieve. This has sparked a slew of research projects including both low- and high-level analysis, tackling issues such as picture classification and segmentation, optical flow, image indexing, and retrieval, object identification and tracking, and scene interpretation and comprehension. Following that, we'll go through some of the

Correspondence to: Rebecca Smith, Editorial Office, International Journal of Advancements in Technology, Spain; E-mail: reaserch@scholarcentral.org

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CONCLUSION

Image processing is a vast and diverse field, with numerous successful applications in both consumer and business markets. Many technical obstacles remain, however, in order to push the boundaries of imaging technology even further. On the one hand, there is a constant push to improve the quality and realism of image and video content, while on the other hand, there is a push to be able to successfully read and comprehend this large and complicated amount of visual data. However, this list is far from complete, and there are numerous other intriguing topics, such as those relating to computational imaging, information security, forensics, or medical imaging. Image processing, optics, psychophysics, communication, computer vision, artificial intelligence, and computer graphics will all play a role in key advances. Multidisciplinary collaborations, involving actors from both academia and industry, are therefore crucial moving ahead in order to achieve these discoveries. Frontier in signal processing's "Image Processing" section seeks to provide a venue for the research community to exchange, discuss, and refine new ideas, with the objective of contributing to the advancement of the area of image processing and bringing exciting innovations in the near future.