KEYWORDS | Video compression / image restoration / graph signal processing

Immersive Visual Communication

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background / purpose (研究背景・目的)

Immersive visual communication means visual experience so real that a participant looks and feels like he resides in an alternate reality, even though he is physically only observing virtual images on a large or wearable display. Immersive visual communication can fundamentally transform long distance human communication, where current tools like Skype provide poor user experience due to network delay & losses, low video quality, and lack of eye contact & depth perception. "Enhance virtual reality", which encompasses immersive communication, is 1 of 14 grand challenges chosen by National Academy of Engineering for the 21st century. Practical applications include high-quality video conferencing, tele-medicine, and distance learning.

the contents of the research (研究内容)

The first part of the research is concerned with visual data processing at sender. Current research topics include: depth data denoising using sparse representation, graph-based transform for compression of visual data, and dynamic geometry compression. The second part of the research is concerned with video streaming over data delivery networks. Current research topics include: region-of-interest (ROI) based video streaming using gaze prediction, multiple description video coding and mulit-path streaming, and visual-saliency-cognizant loss concealment. The third part of the research is concerned with visual data processing at receiver. Current research topics include: virtual view synthesis using depth-image-based rendering (DIBR), visual data interpolation using graph-based transform, gaze-corrected view synthesis, graph-based image super-resolution, and depth-based image inpainting.

possibility of the application to industry (産業応用の可能性)

- Advanced video compression techniques based on graph transforms.
- Image / video denoising and super-resolution via sparse representation.
- Saliency-based image inpainting and error concealment.

invention of the researcher (研究者の発明)

- JP2012－217527（Joint application）（適応型算術輪郭符号化装置及びこれに対応した複号装置）
- JP2012－140268（濃淡画像符号化装置及び複合装置）

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