

Deep cinematography

Masters Thesis Proposal

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DEEP CINEMATOGRAPHY

Objectives

This internship is proposed in the context of the OpenKinoAi project [1] where the goal is to automatically create movies from recordings of live performances, with applications to the preservation of the intangible cultural heritage of theater, opera and dance. In this internship, we would like to propose deep learning methods for generating high quality dynamic cinematographic footage from static camera recordings.

Goals

Our current approach is based on automatic reframing of a moving frame inside the static frame of a ultra high definition video [2]. We are encountering two bottle necks in this process. Firstly, the range of video magnification that can be achieved using traditional video interpolation is limited and does not allow to reveal the faces of actors in closeups. Secondly, controlling the aperture and focus of the camera is difficult during live performances due to the large depth of the stage and wildly varying lighting conditions.

Solution

Drawing on the recent success of deep learning methods in computational photography, we would like to train deep neural networks from pairs of high dynamic range (HDR) videos acquired with wide angle and telephoto lenses on the same scene. We will build a suitable dataset of video pairs with increasing zoom factors for training and testing a generative network to achieve the required resolution and dynamic range. We will implement state of the art methods in super resolution and dynamic range adaptation [3,4,5] and provide an extensive subjective evaluation of their merits and limitations for the case of live performances. We will propose directions for future work.

References

1. Rémi Ronfard and Rémi Colin de Verdière. OpenKinoAI: An Open Source Framework for Intelligent Cinematography and Editing of Live Performances, Arxiv preprint 2011.05203, 2020.
 2. Vineet Gandhi, Rémi Ronfard, Michael Gleicher. Multi-Clip Video Editing from a Single Viewpoint, European Conference on Visual Media Production, 2014.
 3. Chao Dong, Chen Change Loy, Kaiming He, Xiaoou Tang. Image Super-Resolution Using Deep Convolutional Networks. IEEE Trans. Pattern Anal. Mach. Intell. 38(2): 295-307 (2016).
 4. Nima Khademi Kalantari and Ravi Ramamoorthi. Deep High Dynamic Range Imaging of Dynamic Scenes, Siggraph 2017.
 5. Soo Ye Kim and Jihyong Oh and Munchurl Kim. JSI-GAN: GAN-Based Joint Super-Resolution and Inverse Tone-Mapping with Pixel-Wise Task-Specific Filters for UHD HDR Video. Arxiv, 2019.
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