Special Project 2016 August ~ 2017 January

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Project Topic: High Dynamic Radiance image processing

Content:

1. Learning about an image processing technique called High Dynamic Radiance, and implemented it in Matlab code.
   Simply Introduce:
   HDR algorithm uses these differently exposed photographs to recover the response function of the imaging process. With the known response function, the algorithm can fuse the multiple photographs into a single, high dynamic range radiance map.
2. The main limitation of the multiple exposures combination technique is the requirement of a complete static scene when capturing the images. Any object movement in the scene can cause ghosting artefacts in the resulting HDR image.
   Therefore, I studied several papers which introduce different kinds of algorithms for ghost detection and implemented them in Matlab.
   These are the algorithms I implemented:

   • RANSAC – in Matlab

   The method is based on the fact that the intensity values at any location (u; v) is proportional to the exposure time.

   • Bitmap – in Matlab

   In this method, ghost regions are detected based on median bitmaps which impose relations between pixels in each single exposure

   • Multi-level thresholding – in Matlab

   This method detects moving areas in the scene based on multi-level threshold maps

   • Gradient Domain Approach – in Matlab

   The method is based on the fact that the gradient direction in stationary regions remains stable in different exposures, provided that these regions are neither under-exposed nor over-exposed.