

高效率影像合成方法應用 於數位相機之高動態對比影像

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摘要

隨著數位相機的普及化，拍攝數位相片已成為記錄人類生活的一部分，但是，現今的消費型數位相機，在拍攝具有高動態對比的景物時無法完全呈現真實世界的對比度，使得數位相片在極高和極低亮度的細微變化並不明顯，相對的人眼卻能夠輕易分辨出此細微的變化，此一限制造成拍攝的影像並不符合當時人眼所能看到的所有景物。為了使數位相片呈現的動態範圍更接近人類的視覺，本論文提出利用合成兩張具有高低曝光值的影像，可擴大單張相片所無法呈現的對比度，其中，高曝光影像能克服極低亮度時雜訊干擾所造成的物體模糊，以及低曝光影像能顯示出極高亮度景物內的細節變化。

然而，數位相機的輕薄化，使得實現上述合成技術的兩張影像會因手震或拍攝物的移動產生錯位的問題，因此，本論文提出一種快速又簡易的演算法，在進行高動態對比合成演算法之前先校正兩張影像，可避免合成後因錯位所產生出來的疊影。

結合上述提出的影像校正及合成的演算法，本論文成功的得到清楚且輪廓鮮明的影像，同時也提升了影像的動態對比，證明了此演算法可以實現在數位相機上。此外，本論文提出的影像校正技術，可適用於各種不同的合成技術，對於數位相機影像品質的提升具有很大的影響。

Highly Efficient Image Registration Method for Image Fusion Application as High Dynamic Range in Digital Still Camera

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Abstract

As the digital still camera (DSC) becomes popular, digital images are taken to record our lives. However, the images taken by the commercial DSCs can not exhibit a broad range of light variations especially containing both very dark and very bright areas. On the contrary, human vision can tell the tiny difference of light intensity. Therefore, not all details of the scene we see are transformed to the images because of the above limitation of the commercial DSCs. In this thesis, fusing two images with high and low exposures to broaden the dynamic range of the commercial DSCs was proposed. The high exposed image can reduce the noise which causes the unclear objects in dark regions. The low exposed image shows the details in bright areas.

However, the challenges and limitations of above fusion technique from camera shakes and moving objects will cause unpleasant image ghost and degraded quality if two images are misaligned. In this thesis, we proposed a fast and simple image registration algorithm before fusion application of high dynamic range to avoid above artifacts.

Integrating proposed image registration algorithm and fusion for HDR algorithm can achieve an image with clear and sharp contours. In addition, the proposed registration algorithm is appealing for variety of fusion applications in the near future.