中文摘要

對於影像放大技術而言，如何解決在邊緣、輪廓上的高頻訊號部分發生的假影以及模糊的現象是影像放大時的一個重要課題，在局部自相似性的影像放大方法中觀察到了，在以較小的放大倍率放大的圖像中，小的區塊會有自相似性，因此可以被使用來還原放大後所失去的高頻訊號，因為高頻訊號中主要包含了邊緣以及輪廓部分的資訊，對此我們提出了基於梯度搜尋的方法，此方法可以利用高頻訊號的特徵來擷取相似性高的區塊。首先我們觀察了在局部自相似性方法中所找到的範例區塊的分布，並且藉由觀測結果提出一個基於分布比例的雙邊濾波器來使的邊緣能加銳利，與區域自相似方法比較，此方法能夠節省大量的區塊搜尋時間並達到相似的結果。另一方面，對於影像放大中的高頻訊號重建，我們提出了基於 1-D 以及 2-D 梯度的搜尋，2-D 梯度的搜尋中考慮了八個不同方向的推導，使得在邊緣部分的變化可以良好的保存，藉由此方法搜尋到的的區塊對於原本的圖像會有高度的相似性，此外，我們更提出了一個淘汰機制來避免搜尋到錯誤的範例區塊，這個機制能結果能達到更好的視覺效

果。相較於其他方法，重建後的高頻訊號保存了更好的邊緣以及輪廓的資訊。對比於其他近年來的方法，我們所提出的方法中有較高的PSNR以及SSIM數值。

Abstract

For image up-scaling, blurs and ringing at the edges or contours of the high frequency components in the super resolution image is one of the major problems. The local-self-example image up-scaling method observe that small patches are similar to themselves upon small scaling factors so they use small patch search to reconstruct the high frequency components. Since the high frequency components contain mainly the contour and edge information, we propose a gradient based searching approach that utilizes the features of the high frequency components to extract similar patches. In this paper we observe the distribution of example patches' distribution at first and based on the result we proposed an distribution based bilateral filter to sharp the edge region and this approach can have less computation time but have similar result since the search process is removed. On the other side, we present another 1-D and 2-D based gradient search for reconstructing the high frequency components in the super resolution image. The 2-D gradient based search takes eight-direction derivations into consideration so that most edge variations are well preserved, the found patches have high structure similarity between the original image and the up-scaling image. Besides, we also proposed a selection mechanism to avoid the mismatching patch error and achieve better performance. Compared with other recent methods, the reconstructed high frequency components of our proposed methods maintain more edge and contour details. our proposed approaches have better PSNR and SSIM values than other approach.