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摘要(中)	數位半色調法是一種將連續色調的影像轉換成單色調影像的技術，利用數位半色調法我們可以將一個連續色調的影像輸出至二元顯示（黑白）裝置，如：印表機、單色顯示器等等，其問題重點在於如何產生一個二元影

	<p>像，使人類的肉眼能夠將其視為一個連續色調影像而且和原始影像的失真度最少，半色調法利用 dithering 這種方式去決定輸出影像的狀態（打點或不打點），Dithering 演算法是根據不同輸出裝置的物理特性，以這種方式產生黑點或白點，使輸出影像和輸入影像在人類的視覺特性之下能夠盡可能的相同。在實作上有幾種方法；如拼字灰階半色調法(Orthographic halftone)、有序打散法(Order dither :又可分為 Cluster Order dither 和 dispersed Order dither 兩種方式)以及誤差擴散法(Error diffusion technique)等。這些方式均是利用人類眼睛對於高頻變化較不敏銳的原理，使得輸出影像看起來是一個連續灰階的影像，而非不連續的二元影像(黑或白)。本篇論文主要研究非因果關係誤差擴散演算法(Noncausal error diffusion algorithm)，目前的非因果關係演算法主要解決傳統誤差擴散法的一些問題，如：方向磁滯現象(Directional hysteresis)、相關性失真(Correlated artifacts)、瞬間變化失真(Transient behavior)等。然而現今的非因果關係誤差擴散法仍然有以下的缺點，如：蛇紋現象、固定紋裡 (Fixed pattern)、無法對影像的特徵強化、不適用於即時印刷…等等，為了能夠改進這些缺點，我們提出一個非因果關係隨機誤差擴散半色調法(Noncausal random walking error diffusion halftone method)。從實驗結果，我們發現非因果關係隨機誤差擴散半色調法(Noncausal random walking error diffusion method)確實能解決目前擴散法的問題，而以特徵強化為主的方法能夠得到較為銳利的影像。</p>
<p>摘要 (英)</p>	<p>Digital Halftone is a technique that can translate a continuous-tone image to a single-tone one. Using the technique, one continuous-tone image can be output to a binary display device, for example: printer and binary monitor ...etc. which with only two statuses (black or white). The most important issue is how to get a binary image that let human eyes can look the output binary image as a continuous-tone one. There are several methods to implement dithering algorithm, such as Orthography half-toning, Order dither (Cluster order dither, Dispersed order dither) and Error diffusion method etc. All these methods are based on the fact that human eyes are not sensitive to high frequency variation and let human eyes feel like seeing a continuous-tone grayscale image not a binary image. In the thesis, our primary research goal is the noncausal error diffusion halftone algorithm. The noncausal error diffusion halftone algorithm is proposed to solve the problems of traditional causal error diffusion algorithm, such as directional hysteresis、correlated artifacts、transient behavior. But the existing noncausal error diffusion methods still have some shortcomings; such as correlated artifact、fixed pattern、cannot emphasize image feature、cannot suits for real-time printing technique...etc. To improve these shortcomings of the existing methods, we proposed the “Noncausal random walking error diffusion method” and a feature base noncausal error diffusion method. The experiments show that the proposed methods can solve the problems and have a more sharp output image.</p>
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