# Abstract

Inpainting is the process of removing an object from an image and video, and fill the removed portion in such a way that a naive observer is not able to detect any dis-ambiguity in the image. The image inpainting algorithms developed so far give visually inconsistent results in images, containing complex textures and structures. This dissertation presents some novel algorithms for image inpainting, and uses them to solve few image processing problems. The possible causes of failure of previous image inpainting algorithms are investigated. Few possible causes are inaccurate priority term, and greedy nature of the process of filling target region. Of the proposed techniques, two (named MEBI and LIMEP) address the issue of inaccurate priority term, and three techniques (named MEBIPO, COMEP, and IIMI ) tackle the greedy nature of filling process. The MEBI algorithm modifies the priority term to propagate linear structures in a better way, and the LIMEP algorithm modifies the filling process, to retain linear structures. Both these techniques give better reconstruction result as compared to previous techniques. The LIMEP algorithm is better than the MEBI algorithm for object removal, while the MEBI algorithm is preferred over the LIMEP algorithm for removal of small regions, like scratches, overlaid texts, fences, etc. The MEBIPO, COMEP, and IIMI algorithms map the image inpainting problem to a metric labeling problem. The metric labeling problem for the MEBIPO and COMEP algorithms are same, while the solution approach is different. The MEBIPO algorithm uses the primal dual schema of the linear programming to solve the metric labeling problem, while the COMEP algorithm solves it through a combinatorial approximation approach, which uses a image quality measure. The IIMI algorithm presents a different metric labeling formulation of the inpainting problem. It uses multiple instances of inpainted images, which are obtained by different filling orders. The cost is minimized through simulated annealing. It also uses a quality measure to ensure that the algorithm proceeds towards generating a good quality image. Results demonstrate the effectiveness of these three techniques in generating good inpainted images.