Local Edge-Preserving Image Inpainting with Mixed Weighted Anisotropic Regularization Methods

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ABSTRACT

The image inpainting problem consists of restoring an image from a possibly noisy version of it, in which data from one or more regions is missing. Over the last couple of decades, several inpainting models to perform this task have been developed. Although some of these models perform reasonably well in certain types of images, quite a few issues are yet to be sorted out. For instance, if the true image is smooth, the inpainting can be performed with very good results by the means of a Bayesian approach and a maximum a posteriori computation [1]. For non-smooth images, however, such an approach is far from being satisfactory. Even though the introduction of anisotropy by prior gradient inpainting to the latter methodology is shown to produce satisfactory results for slim missing regions, the quality of the restoration decays as the occlusions widen. On the other hand, Total Variation (TV) inpainting models based on high order PDE diffusion equations can be used whenever edge restoration is a priority. More recently, the introduction of spatially variant conductivity coefficients to these models, such as in the case of Curvature-Driven Diffusions (CDD) [2], has allowed inpainted restorations with well defined edges and enhanced object conectivity. The CDD approach, nonetheless, is not quite suitable wherever the image is smooth, as it tends to produce piecewise constant restorations.

In this work we shall combine the ideas of gradient inpainting for introducing anisotropy along with the notion of isophote curvature into a mixed penalization inpainting model [3] to produce an edge-preserving restoration that also allows for inpainting of smooth areas without precluding object conectivity. Several results will be presented and comparisons will be made in order to illustrate the performance of the different penalizers in conjunction with the corresponding parameter estimation criteria and computing methods.

REFERENCES

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