Exemplar-Based Image Inpainting and Applications

V. Caselles*

Abstract

Image inpainting consists in recovering the missing or corrupted parts of an image so that the reconstructed image looks natural. The purpose of this talk will be to give an overview of recent techniques in non-local exemplar-based image inpainting and its applications in video and cinema post-production.

Non-local methods for image denoising and inpainting have gained considerable attention in recent years. This is due to their superior performance in textured images, a known weakness of purely local methods. Local methods on the other hand have shown to be very appropriate for the recovering of geometric structure such as image edges. The synthesis of both types of methods is a trend in current research. Variational analysis in particular is an appropriate tool for a unified treatment of local and non-local methods. We present a general variational framework for the problem of non-local image inpainting, from which some previous inpainting schemes can be derived, in addition to leading to novel ones. We give an statistical mechanics interpretation of the proposed framework.

We also study the properties of the variational formulation of the Efros-Leung copying scheme.

We show applications of image inpainting to different problems: interpolation of sparsely sampled images, the replacement of objects in video sequences, and to the post-production of depth-enhanced imagery.

References

[1] P. Arias, V. Caselles, G. Facciolo, and G. Sapiro. Variational Framework for Exemplar-Based Image Inpainting. Preprint, 2010.

[2] P. Arias, V. Caselles, and G. Sapiro. A variational framework for non-local image inpainting. Proc. of the 7th Int. Conf. on Energy Minimization Methods in Computer Vision and Pattern Recognition EMMCVPR, Springer LNCS, Bonn, August 2009.

[3] G. Facciolo, P. Arias, V. Caselles, and G. Sapiro. Exemplar-Based Interpolation of Sparsely Sampled Images, Proce. of the 7th Int. Conf. on Energy Minimization Methods in Computer Vision and Pattern Recognition, EMMCVPR, Springer LNCS Bonn, August 2009.

[4] P. Arias, V. Caselles, and G. Facciolo. Algorithms for a variational framework for non-local image inpainting. Preprint, July 2011.

*Departament de Tecnologies de la Informació i les Comunicacions, Universitat Pompeu-Fabra, Barcelona, Spain, e-mail: vicent.caselles@upf.edu