Publicacions més rellevants de la línia de recerca:

Processament d'imatges i aplicacions a post-producció en cinema i TV digitals

Referència: Palma, R., Provenzi, E., Bertalmío, M., and Caselles, V. A Perceptually Inspired Variational Framework for Color Enhancement. IEEE transactions on Pattern Analysis and Machine Intelligence, **31(1)** (2009), pp. 458-474.

Abstract: The basic phenomenology of human color vision has been widely taken as an inspiration to devise explicit color correction algorithms. The behavior of these models in terms of significative image features (such as contrast and dispersion) can be difficult to characterize. To cope with this, we propose using a variational formulation of color contrast enhancement that is inspired by the basic phenomenology of color perception. In particular, we devise a set of basic requirements to be fulfilled by an energy to be considered as "perceptually inspired", showing that there is an explicit class of functionals satisfying all of them. We single out three explicit functionals that we consider of basic interest, showing similarities and differences with existing models. The minima of such functionals is computed using a gradient descent approach. We also present a general methodology to reduce the computational cost of the algorithms under analysis from $O(N)$ to $O(N \log N)$, where N is the number of input pixels.

Referència: Ballester, C., Bertalmío, M., Caselles, V., Garrido, L., Marqués, A., Ranchin, F.. An Inpainting-based deinterlacing method, IEEE Transactions on Image Processing, **16 (10)** (2007), pp. 2476 - 2491.

Abstract: Video is usually acquired in interlaced format, where each image frame is composed of two image fields, each field holding same parity lines. But many display devices require progressive video as input, and also many video processing tasks perform better on progressive material than on interlaced video. In the literature there exist a great number of algorithms for interlaced to progressive video conversion, with a great trade-off between speed and quality of the results. The best algorithms in terms of image quality require motion compensation, hence they are computationally very intensive. In this article we propose a novel de-interlacing algorithm based on ideas from the image inpainting arena. We view the lines to interpolate as gaps that we need to inpaint. Numerically this is implemented using a dynamic programming procedure, which ensures a complexity of $O(N)$, where N is the number of pixels in the image. The results obtained with our algorithm compare favorably, in terms of image quality, with state of the art methods, but at

a much lower computational cost since we do not need to perform motion field estimation.

Referència: Caselles, V., Monasse, P.. Geometric Description of Images as Topographic Maps. Lecture Notes in Mathematics , Vol. 1984 Springer Lecture Notes in Mathematics, 192 pp., 2010.

Abstract: This book discusses the basic geometric contents of an image and presents a tree data structure to handle it efficiently. It analyzes also some morphological operators that simplify this geometric contents and their implementation in terms of the data structures introduced. It finally reviews several applications to image comparison and registration, to edge and corner computation, and the selection of features associated to a given scale in images.