

## Image inpainting via Dirichlet problems with free discontinuities

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The Blake & Zisserman's energy functional exhibits a second order variational model in visual reconstruction; it is based on the competition between a 2-dimensional bulk energy, and a lineic energy; the lineic energy amounts to the length of jumps and creases of admissible functions: respectively the free discontinuity and the free gradient-discontinuity, whose supports are the most relevant unknown of the minimization problem.

Neumann problem, related to contour detection in image segmentation, has been studied in the past years.

Our recent developments concerning Dirichlet problem for Blake & Zisserman functional fit a new variational approach to the inpainting problem, which consists in reinventing some missing or damaged parts in an image, using information from surrounding regions.

We propose a 2-dimensional, variational inpainting model, for monochromatic images which are locally damaged, its variational approximation and the numerical analysis of the problem.

The scheme provides the Gamma-convergence of a sequence of elliptic functionals with penalized Dirichlet datum, to a Dirichlet problem with free discontinuity and free gradient discontinuity.

Some pictures, obtained in numerical experiments which exploit the variational approximation, are presented.

The talk is based on a joint research with A.Leaci and F.Tomarelli.