Contributions à des approches informationnelles en imagerie : Traitements conjoints et Résonance stochastique

Imaging systems are continuously improving and their uses are spreading more and more widely. Imaging systems are based on various physical principles, with a sophistication which keeps enhancing (magnetic resonance imaging, thermography, multi and hyperspectral imaging). Beyond this heterogeneity of constitution, the resulting images share the property of being a support of information. In this context, we propose a contribution to informational approaches in imaging. This is especially guided by a transposition of Shannon’s informational paradigm to imaging along two main directions. We present a joint-processing approach where the informational goal of the acquired images is a prior knowledge which is exploited in order to optimize some tuning configurations of the imaging systems. Different joint-processing problems are examined (joint observation scale - estimation, joint compression - estimation, and joint acquisition - compression). We then extend the field of stochastic resonance studies by exploring some new signal-noise mixtures enabling useful noise effects, in coherent imaging and in magnetic resonance imaging. Stochastic resonance is also considered for its specific informational significance (the noise useful to information), as a phenomenon allowing to test and further assess the properties and potentialities of entropic or informational measures applied to imaging. Stochastic resonance is especially used as a benchmark to confront such informational measures to psychovisual measures on images.
Notes
Directeur de thèse : François Chapeau-Blondeau
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Président du jury Pascal Picart

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