

Building New Kernel Family with Compact Support, in Scale-Space.

L. Remaki and M. Cheriet¹

Laboratoire d'Imagerie, de Vision et d'Intelligence Artificielle

École de Technologie Supérieure de l'Université du Québec

1100 rue Notre-Dame Ouest, Montréal, Québec, Canada H3C 1K3

remaki@livia.etsmtl.ca; cheriet@gpa.etsmtl.ca

ABSTRACT

Scale-space representation is one formulation of the multi-scale representation which has received considerable interest in the literature, because of its efficiency in several practical applications, and the distinct properties of the Gaussian kernel which generates the Scale-space. However, in practice, we note some undesirable limitations when using the Gaussian kernel: information loss caused by the unavoidable Gaussian truncation and the prohibitive processing time due to the mask size. To give a solution to both problems, we propose in this paper a new kernel family with compact support derived from the Gaussian, which are able to recover the information loss while reducing drastically the processing time. This family preserves a great part of the useful Gaussian properties, without contradicting

the uniqueness of the Gaussian kernel. The construction and some properties of the proposed kernels are developed in this paper. Furthermore, in order to assess our contribution, an application of extracting handwritten data from noisy document images is presented, including a qualitative and quantitative comparison between results obtained by the Gaussian and the proposed kernels.

Key Words Multi-scale representation, scale-space representation, compact support, kernels, functional space, image segmentation, handwritten data, handwritten data extraction.

