

# Statistical analysis of distance functions for digital image processing applications

**András Hajdu, János Kormos, Zoltán Zörgő**

Institute of Informatics, University of Debrecen  
{hajdua|kormos|zorgoz}@inf.unideb.hu

## **Abstract**

Distance functions play important role at all those parts of digital geometry (hence digital image processing) which use distance measurement. In such applications the final results highly depend on the chosen distance functions, but the literature contains very few guidelines for how to choose them in general. The obvious reason of this poor support is that it is very sophisticated to handle these problems theoretically, and e.g. perform an optimisation for some parameters to determine "optimal" distance functions. If the given task is well-defined it is still not easy to find appropriate distance functions and probably other parameters used by the chosen technique. Our aim is to provide such tools that may help to someone with finding the suitable distance measurement. Based on these tools, we also perform statistical investigations on how the decision of the choice of the optimal distance measurement can be made automatic. In our analysis we focus on multidimensional image processing applications (colour image indexing/segmentation) but the proposed methods seem to be easily extended to other areas. As these areas are based on integer domains, the application of digital distance functions is also a natural point, and as a special case we also observe the very rich family of distance functions generated by neighbourhood sequences.