

## Project proposal template

### Graduate School studentships

### March 2015

<i>Project title</i>	Evolutionary ordering of multidimensional spaces. Application to image processing and computer vision	
<i>First Supervisor</i>	Dr <input type="text" value=""/>	<input type="text" value="Jean-Christophe Nebel"/>
<i>Second Supervisor</i>	<input type="text" value="Dr Francisco Florez-Revuelta"/>	
<i>School</i>	<input type="text" value="Computing and Information Systems"/>	
<i>Other member of supervisory team (no more than three KU supervisors in total)</i>	<input type="text" value=""/>	
<i>Specific requirements beyond 2:1 degree</i>	<input type="text" value="Degree in computing science or equivalent"/>	

**Project summary**  
**(max 4,000 characters)**

Mathematical morphology (MM) is used for image processing in different applications: noise filtering, shape simplification, edge detection, skeletonisation, shape analysis, segmentation... MM has two basic operators, erosion and dilation, from which many other morphological operations are derived. These operators rely on an ordering of the pixel values. MM is applied to a set provided with an order and with a supremum and an infimum pertaining to that order. This is the reason why MM has been mainly applied to binary or grayscale images. Extension to multivariate data, as colour images, is not straightforward, because there is not an ordered relationship among vectors.

This project will investigate different alternatives to obtain orderings that preserve the topology of the input space. Besides, as calculating those orderings are computationally expensive, different proposals using evolutionary computation will be considered.

These evolutionary ordering methods will be applied to different of image processing and computer vision problems, considering a variety of multidimensional spaces: colours, histograms, bags of words...

