



Marked point processes for detecting planetary craters in images

Proposal for a Bachelor or Master thesis topic (DE/EN)

Stochastic processes provide a promising method for the description of random events. These include marked point processes that aim to find the subset of a large amount of data that best describes an observed phenomenon. In remote sensing, marked point processes are used to detect irregularly distributed objects in different data sets, e.g. from satellites or airplanes. First, the modelling of the objects to be detected is required. Using a Markov Chain Monte Carlo method, object configurations are randomly generated and the solution is iteratively optimized while its quality is evaluated based on energy terms.

The aim of the thesis is to apply marked point processes for the automatic detection of planetary craters in satellite data. For this purpose, a software developed at the institute is available. However, this software pursues a different goal, namely the detection of bomb craters in aerial wartime images (Fig. 1, top row). For this reason, the first step is to test the applicability of the existing method on varying images with planetary craters (Fig. 1, bottom row). Furthermore, the influences of different parameter settings on the result should be analysed. Finally, methods to optimize the detection of planetary craters will be developed.

Figure 1: Subset of an aerial wartime image (top left) and planetary image (bottom left) as well as the result of the automatic detection of craters, which are marked as yellow dots (top right, bottom right).

