PHOTO-IDENTIFICATION OF BOTTLENOSE DOLPHINS USING MCMC

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In animal behaviour and ecology the ability to recognise individuals is very important and most long-living animals can be identified by natural marks. In the case of marine mammals photo-identification must be used, and for bottlenose dolphins recognition is done via their dorsal fins. Here we propose to identify individual bottlenose dolphins by means of a parametric model for their dorsal fin shape. Our model has a total of twelve parameters (eight characterising the shape and four to account for the distance and (3-D) angles to the dolphin being photographed) yielding quite a complicated model curve. The raw data consists of photographs of dorsal fins from which the outline must be extracted. The pixel coordinates in this outline will be the datapoints to which the model must be fitted. To do this we use a Bayesian regression approach to model fitting, with errors in both the x and y variables. In a previous approach we considered using bivariate normal errors, whereas here we propose a more realistic error structure, that gives rise to square, instead of circular, contour plots. Extra considerations must be given while doing the estimation and in this talk we demonstrate how MCMC methods can be used to fit the model to data.