Abstract

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Classification task in the context of replicated point patterns

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Classification task, one of the fundamental tasks in machine learning and also in statistics, aims to classify a new observation to the one of the k possible classes. In the point pattern setting, its purpose is to label the incoming observed pattern with one of the k possible labels.

For solving the classification task numerous methods are available. Some of them are related with measuring dissimilarities between investigated objects. In the point pattern setting, there exist various metrics that can be used as a dissimilarity measure (e.g. the Hausdorff metric), but most of them ignore some important properties of the underlying point pattern data.

We propose a non-parametric approach to solving the classification task in the context of replicated point patterns using the kernel regression method. In this case we consider a semimetric based on functional summary characteristics as a dissimilarity measure. The employment of functional summary characteristics could be quite advantageous, since they contain a valuable information about the geometrical structure hidden in the investigated data. Performance of this method will be illustrated by means of simulation study and some examples of the classification task for real point pattern data will be discussed.