

**New nonparametric tools for circular regression**

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**ABSTRACT**

Advances on technology have allowed to precisely record different kinds of data which are beyond the Euclidean space. For instance, many recent statistical works deal with estimation and inference methods for data supported on manifolds. A simple particular case is circular data, where the support of the variables is the unit circumference. Angles, directions or any periodic variable can be regarded as circular data. Examples of circular data are found on many different fields, such as biology (orientation and escape directions in animals), meteorology (wind and wave directions) or many others.

The particular nature of this type of data must be taken into account when applying any statistical technique, and most estimation and inferential methods must be adapted to deal with the periodicity of the data.

In particular, in this work we focus on the case of regression when one or all the variables are of a circular nature. We introduce several real data examples of regression problems involving circular variables, such as the study of escape directions in animals as a function of the direction in which a predator chases them or the number of spikes of a neuron cell as a function of a direction of stimulus. We present different nonparametric regression estimators suitable to the distinct context and provide some inferential tools to assess simplifying hypothesis.