

First Joint Meeting Brazil Italy of Mathematics Special Session: Analytical and Numerical Aspects in Modeling Biological Systems

Rio de Janeiro, August 29 - September 02, 2016

Title: The Use of a kNN classifier to Modelling Fire Risk

Authors: Isaac D. B. Silva; Laécio C. Barros; João F. C. A. Meyer.

Abstract: Forest fires that generally happen in the Amazon region considered as a whole system have been a result of severe draughts that occur in the region, besides the use of 'cut-and-set-fire' technique of opening up spaces for agricultural purposes. These fires often escape human control and containment activities, running out of control. The main purpose of this work is to model the fire risk associated with spatial informations using a function R_e which associates spatial variables in a certain domain $\Omega \subset \mathbb{R}^n$ to the image set \mathbb{R} in way that, for each $x \in \mathbb{R}^n$, $y = R_e(x) \in [0, 1]$ represents the risk of fire spatially associated. To get these results, the original problem was reformulated and transformed into a problem of binary classification including georeferenced information for both, independent and dependent variables. For this, computational learning was used in order to obtain an efficient classifier and the fire risk is treated as the posteriori probability of that classification. This binary classification algorithm of the closest k-neighbors (k-NN stands for k-Nearest Neighbors) has a learning procedure based upon memory and identifies the class of a particular test vector x_t from the majority vote of the k-nearest neighbors of x_t . For computational simulations, the data (georeferenced) from the State of Acre in the Brazilian Amazon region were used.