



guidebook

16° WORKSHOP DE

# WORCAP



COMPUTAÇÃO

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Auditório Fernando de Mendonça - LIT  
Instituto Nacional de Pesquisas Espaciais

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**Livro de Resumos**  
**16 Workshop de Computação Aplicada**  
Pós-Graduação em Computação Aplicada (CAP)

25 e 26 de outubro de 2016

Auditório Fernando de Mendonça, Laboratório de Integração e Testes (LIT)  
Instituto Nacional de Pesquisas Espaciais (INPE)  
São José dos Campos – SP  
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As redes Bayesianas são capazes de inferir a probabilidade de ocorrência de um determinado fenômeno espacial baseado na observação destas variáveis. Neste sentido, este trabalho propõe uma abordagem de redes Bayesianas para identificar áreas potenciais à expansão da cana-de-açúcar nos estados de Goiás e Mato Grosso do Sul. Esta problemática é abordada devido à intensa demanda por etanol que tem impulsionado a expansão da cultura de cana-de-açúcar em direção ao bioma Cerrado. O e-BayNeRD algoritmo (enhanced Bayesian Network for Raster Data) foi utilizado para identificar as áreas mais adequadas à expansão da cana-de-açúcar. O e-BayNeRD é um método baseado na observação de dados raster (dados em formato matricial) e capaz de incorporar o conhecimento do especialista nas análises. O método considera fatores restritivos à expansão da cana-de-açúcar como topografia, aptidão do solo, condições climáticas e infraestruturas disponíveis para indicar áreas sustentáveis e logisticamente apropriadas para expansão da cultura. O resultado do método é uma imagem de probabilidade, a qual pode ser utilizada para direcionar a expansão da cana-de-açúcar para áreas com maior potencial. Os resultados mostraram que os modelos de redes Bayesianas propostos foram capazes de representar a tendência de expansão da cultura, visto que a maior parte das novas áreas plantadas ocorreu em regiões que o modelo atribuiu com probabilidade superior a 70

## **SPECTRAL ATTRIBUTES SELECTION BASED ON DATA MINING FOR REMOTE SENSING IMAGE CLASSIFICATION**

*Raian Maretto, Thales Korting, Emiliano Castejon, Leila Fonseca, Rafael Santos*

Remote sensing images are a rich source of information for studying large-scale geographic areas. The increased accessibility of the new generation high-spatial resolution multispectral sensors has improved the level of complexity required in the analysis techniques. In particular, many traditional per-pixel analysis may not be suitable to high-spatial resolution imagery, due to its high-frequency components and the horizontal layover caused by off-nadir look angles [Im et al. 2008]. Aiming to overcome this problem, in the last decades, several approaches and platforms have been developed with algorithms that consider contextual information and pixel region properties [Körting et al. 2013; Syed et al. 2005; Walter 2004]. Current software can extract several statistical, spatial, color, texture or topological attributes. However, most of them often do not help to distinguish between the classes of interest, due to its high correlation. Thus, the attributes selection phase often relies on ad hoc decisions about what of them can better describe the classes. The huge number of attributes available makes a detailed exploratory time-consuming and dependent on expertise [Körting et al. 2013]. Many works have proved that data mining techniques can be useful to this purpose [Dash and Liu 1997; Kohavi and Kohavi 1997; Laliberte et al. 2012]. In this context, the main objective of this work is to analyze the correlation of the spectral attributes between a set of classes of interest, in order to verify what of them best distinguish these classes. A case study is presented over a small region of the city of São José dos Campos, using a WorldView-2 image. It is important to emphasize that although this study is in a preliminary stage, the results are promising and reached improvements in the accuracy of the classification, even as a good reduction in the computational time.

## **OPTIMIZATION OF THE COMPUTATIONAL PERFORMANCE OF RADIATIVE TRANSFER MODEL**

*Jefferson Souza, Celso Mendes*

In this work, ways are being sought to improve the computational efficiency of the radiative transfer model BrasilSR. This model was adapted to Brazilian conditions by LABREN/CCST/INPE, the main feature of this group is to quantify the solar energy resource, from incident solar radiation estimates from the Earth's surface. This is achieved by combining the approach of two streams in the solution of a radiative transfer equation with the use of climatological data and parameters determined from GOES family of satellite images. The computer code presents results in models used by the scientific community. However, due to its computational cost, there is a high processing time involved when such processing is performed in conventional processors (typically a few days of processing). In the first phase of this study, an analysis is being carried out of the performance of the original version of the model - which is performed in sequential mode - in order to indicate which processes are the most computationally expensive ones. From these initial results, some parallelization techniques are being explored in order to optimize their more intensive sections, on the assumption that the parallelization through the use of multiple threads in a shared memory environment could bring improvements to the code. The implementation of this kind of parallelization can be accomplished with standard OpenMP directives, which allow the creation and automatic management of threads, without much programming effort. The effectiveness of this type of parallelization can be measured by model performance comparisons as more threads are used in its execution.

## **GERENCIAMENTO INTEGRADO DE FROTAS BASEADO NO PROGNÓSTICO E MONITORAMENTO DE FALHAS DO VEÍCULO**

*Ivo Medeiros, Rafael Santos, Elcio Shiguemori*

Esse trabalho trata do suporte a tomada de decisão em relação ao gerenciamento integrado da operação e manutenção de uma frota de veículos e do estoque de peças para realizar manutenção; baseados na informação sobre a saúde de cada veículo.