A search algorithm to meta-optimize the parameters for an extended Kalman filter to improve classification on hyper-temporal images

B.P. Salmon, W. Kleynhans, F. van den Bergh, J.C. Olivier, W.J. Marais, T.L. Grobler, and K.J. Wessels

y Department of Electrical, Electronic and Computer Engineering, University of Pretoria, South Africa

Z Remote Sensing Research Unit, Meraka Institute, CSIR, Pretoria, South Africa

bsalmon@csir.co.za

# Defense, Peace, Safety and Security Unit, CSIR, Pretoria, South Africa

x School of Engineering, University of Tasmania, Australia

* Space Science and Engineering Center, University of Wisconsin-Madison, Wisconsin, United States

ABSTRACT

In this paper the Bias Variance Search Algorithm is proposed as an algorithm to optimize a candidate set of initial parameters for an Extended Kalman filter (EKF). The search algorithm operates on a Bias Variance Equilibrium Point criterion to determine how to set the initial parameters. The candidate set is then used by the EKF to estimate state parameters to fit a triply modulated cosine function to time series of the first two spectral bands of the MODerate-resolution Imaging Spectroradiometer (MODIS) land product. The state parameters are then used for land cover classification. The results of the search algorithm were tested on classifying land cover in the Limpopo province, South Africa. An improvement in land cover classification was observed when the method was compared to a robust regression method.