

Simulation-based optimal design for estimating weed density in agricultural fields

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In order to manage herbicide treatment we present a method for optimizing the locations of weed density measurements. The practical problem is to estimate weed density in each one of the n quadrats of a field, assuming that m measurements were already collected and using p additional measurements optimally located. The proposed method consists in three steps: 1) fit a statistical model to the m available measurements taking into account nature of the data, 2) define possible locations of the p additional measurements using a simulated-annealing algorithm, 3) assess the designs using weed density values simulated using the fitted statistical model. This method is applied to several wheat fields and the results show that it improves weed density predictions. Sensitivity to several tuning parameters is discussed.