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Correcting position of delayed on-the-go field measurements by optimizing nearest neighbor statistics

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On-the-go field measurements of soil and plant characteristics, including yield, are commonplace in current Precision Agriculture applications. Yet, such measurements can be affected by positional inaccuracies that result from equipment configuration or operation characteristics (e.g. GPS antenna position with respect to sensor position) and delays in the data transmission, reception or logging. The resulting time and position lags cause a misfit between the measurements and their attributed GPS position.

In order to compensate for this effect a simple coordinate translation along the measurement direction is proposed, depending on the local velocity and a field- and measurement configuration-specific time lag, which is estimated by minimizing the average absolute difference between the nearest neighbors. The correction procedure is demonstrated using electromagnetic induction data with different spatial configurations and by comparing
variograms for corrected and non-corrected data.

Best results are obtained when overlapping measurements are available, obtained in opposite driving directions, while the worst results are found when no overlapping measurements exist or only those corresponding to headland turns. Further improvements in the nearest neighbor search algorithm, e.g. by imposing the search in adjacent measurement swaths are discussed. The results are valid beyond motorized soil sensing applications.

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