

## **Generating Product Traceability Trees for Harvesting from GPS Tracks**

Authors: Yaguang Zhang, Andrew Balmos, Aaron Ault, Dennis Buckmaster, James Krogmeier, Purdue University

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### Abstract:

With increasing concerns about food safety worldwide in many countries, product traceability has become an irreplaceable risk-management tool. It enables the identification of possible sources for defective goods, and furthermore, the withdraw or recall of affected products to protect consumers from foodborne diseases. However, it is troublesome for farmers to maintain records required by high-precision product traceability during harvesting, because traditional traceability systems usually involve human labor in paper work or extra expenses on electronic equipment purchase and installation, and either way the resulting records are normally far away from user-friendly. In this paper, a fully-automatic algorithm is proposed for efficiently generating product traceability trees to visualize and store the full transportation record of wheat from fields to elevators. Extending previous works of harvesting activity recognition via GPS tracks, this algorithm demonstrates great potential of tracing product using only GPS logs for vehicles involved in the harvesting. From the output trees, product yielded at any point of the field can be tracked all the way to the elevator where it was sold/stored, by starting from the corresponding leaf and walking all the way to the root of its tree. Furthermore, each truckload of product unloaded together at any destination elevator can be traced back to areas where the corresponding product was harvested, by following the corresponding tree in the opposite direction. In this way, the traceability records can be not only clearly visualized for farmers but also easily utilized by other algorithms.