Big data for farm machines: an algorithm for estimating tractors’ operating costs

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**Abstract.** The estimation of operating costs for agricultural tractors is a key element for decision-making processes in every farming business, contributing to assess the feasibility of investments in machinery and hence the impact on farming’s profitability indexes, like the return on investment (ROI). However, the variation of a series of parameters over the years, such as environmental conditions, technological innovations, field capacity and agricultural machines performance, have led nowadays to a different impact on these indexes.

The goal is to provide new tools for precise estimation of tractor’s operating costs based on information gathered from machines through CANBUS interfaces and geospatial data processing. To do so, GPS data from machines have been gathered and matched with European’s Copernicus digital elevation models (DEM) in order to accompany the dataset with elevation data, distance and average speed information.

As a result, after data aggregation, the algorithm made it possible to determine the working times, fuel consumption and areas worked for the open field operations examined. All the information can also be displayed on geographic information systems (GIS) or Earth browsers.

Such parameters could provide detailed estimation of operating costs for any farming business. Further developments can include maintenance alerts, performance analysis for equipment, and also enable additional activity classification (ploughing, mowing, pesticide distribution, fertilization, etc).