Technology comparison of surround sensors for mobile machines

Change from rule-based systems to Deep Learning

Zusammenfassung:

Today farmers are confronted with several challenges. Societal change toward increased environmental awareness demands greater environmental protection and more sustainable cultivation. At the same time, economic pressures are also increasing: due to new crop rotations, extreme weather conditions and an increase of the food production.
In order to meet both societal and political requirements, a digital transformation of agricultural machinery is necessary and can be seen already. Mobile machines are increasingly being equipped with different types of sensors such as LIDAR, RADAR, Ultrasound or Cameras in order to advance automation - and at some point, make the transition to autonomy. In this connection, the integration and interaction of different sensor types is very important and offers a great opportunity for agriculture. Especially in this field, sensor systems have to overcome a wide variety of challenges such as low light or bad weather conditions. To manage this, a significant shift in traditional rule-based systems to Deep Learning is evident. However, it should be considered that Neural Networks have limits or in this case uncertainties. These uncertainties can be caused through different reasons – because of the data itself, the model or the distribution of the data. There are different Uncertainty-Quantification-Methods for estimating the uncertainties like the Single Network Determistic Methods or the Bayesian Methods in order to solve an uncertainty and to develop a good Neuronal Network for automated driving in the agriculture.

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