Precision Agriculture and Data Driven Decision Making on Farms

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Abstract: This talk I will present some of my current research in data driven decision making in Agriculture as part of the Farm Beats project. Several studies have demonstrated the need to significantly increase the world's food production by 2050. However, there is limited amount of additional arable land, and water levels have also been receding. Although technology could help the farmer, its adoption is limited because the farms usually do not have power, or Internet connectivity, and the farmers are typically not technology savvy. We are working towards an end-to-end approach, from sensors to edge intelligence to operations research, to solve the problem. Our goal is to enable data-driven farming. We believe that data, coupled with the farmer's knowledge and intuition about his or her farm, can help increase farm productivity, and also help reduce costs.

I will present a generic overview of research problems in real-world deployment of agricultural solutions. I will also do a deeper dive into a specific project on micro-climate predictions and challenges involved. Micro-climate is the accumulation of climatic parameters formed around a (approximately) homogeneous and relatively smaller region. Knowledge of micro-climate and micro-climate predictions are used to aid decision making on regions of the farm all the way from pre-planning logistics to seeding, farm management and harvesting. The framework for micro-climate prediction (DeepMC) uses various methodology from signal analysis, deep learning, etc.

FarmBeats project was featured by Bill Gates in gatesnotes -
https://www.youtube.com/watch?v=BCIohEJYxdY

Bio: Peeyush Kumar is a researcher at Microsoft Azure Global Research. His research interests are in data driven decision making under uncertainty to create opportunities for people and processes to thrive. His research is largely in the field of reinforcement learning, deep learning, dynamic systems under uncertainty, stochastic processes and natural language processing. He is active in various research and industrial communities in Artificial Intelligence, control systems and operations research, and continue to review work for publications.

At Microsoft, Peeyush is working on FarmBeats project to enable sustainable and efficient decision making in agriculture. Prior to joining Microsoft, Peeyush worked in healthcare technology. He is the co-founder of Cohort Intelligence, a software as a service (SaaS) healthcare technology company that is augmenting clinicians' workflow for chronic care management and clinical trials, based on his research in natural language processing for clinical workflows.

Peeyush has an undergraduate degree from IIT Madras and PhD from University of Washington.