

Fall 2019 Graduate Seminar Series

Classification of Crop Tolerance to Heat and Drought: A Deep Convolutional Neural Networks Approach



Mr. Saeed Khaki

PhD Student

Department of Industrial and Manufacturing Systems Engineering
Iowa State University

Wednesday, October 16, 2019, 4:10 pm, 1140 Howe Hall

Abstract

The world's population is on the rise and in order to feed the world in 2050, food production will need to increase by 70%. Today, the agriculture industry works to optimize the amount of food gained from plants by breeding plants which are tolerant to environmental stresses such as heat and drought.

Environmental stresses such as drought and heat can cause substantial yield loss in agriculture. As such, hybrid crops that are tolerant to drought and heat stress would produce more consistent yields compared to the hybrids that are not tolerant to these stresses. In the 2019 Syngenta Crop Challenge, Syngenta released several large datasets that recorded the yield performances of 2,452 corn hybrids planted in 1,560 locations between 2008 and 2017 and asked participants to classify the corn hybrids as either tolerant or susceptible to drought stress, heat stress, and combined drought and heat stress. However, no data was provided that classified any set of hybrids as tolerant or susceptible to any type of stress. In this presentation, we introduce an unsupervised approach to solving this problem, which was recognized as one of the winners in the 2019 Syngenta Crop Challenge. Our results labeled 121 hybrids as drought tolerant, 193 as heat tolerant, and 29 as tolerant to both stresses.

About the Speaker

Mr. Saeed Khaki is a Ph.D. student in Industrial Engineering at Iowa State University. He is also a M.S. student in Statistics at Iowa State University. He received his master's and bachelor's degrees in Industrial Engineering at Amirkabir University of Technology. His research interests are machine learning, deep learning, and optimization.