Deep Learning Techniques for Flash Flood Management

Presentation Topic

Flash flooding is considered the most dangerous type of flooding because of the speed at which it occurs. In addition to making flash flooding more dangerous it make predicting their occurrence much more challenging. Currently there is no methodology available that provides both risk quantification and optimal rerouting guidance.

This research uses publicly available geospatial data to create a historic flash flood database that is then used as an input for a deep learning model capable of classifying flash flood risk for discrete locations within an area of interest (AOI). The project scope includes analysis of publicly available flash flood data for a subwatershed in Greene County, Missouri that frequently experiences flash floods. The algorithms used in this research capture the complex relationship between geospatial characteristics and rainfall data to classify locations on the basis of their flash flood risk. Elevation, slope, aspect, and curvature constitute the geospatial data whereas day-of and prior rainfall observations represent the latter. Three machine learning models were used: artificial neural network, logistic regression, and support vector machine. The artificial neural network exhibited superior performance with a prediction accuracy of 85.23%. An additional component of the framework is the determination of optimal rerouting protocols that takes into account in-route traffic and road segments at high risk for flash flood events. This feature provides transportation officials with critical information that can guide the deployment of resources in a timely manner to minimize risk exposure to motorists.

About the Speaker

Dr. Steven M. Corns is an Associate Professor of Engineering Management and Systems Engineering at Missouri University of Science and Technology. He received his PhD degree in mechanical engineering from Iowa State University in 2008.

Dr. Corns research interests include computational intelligence applications, the mechanics of information transfer in evolutionary algorithms, and model based approaches for complex systems design and analysis. Applications include computational biology/bioinformatics, transportation, and defense. He has applied computational intelligence techniques to disaster modeling and restoration planning for several years, including two projects involving flooding prediction and associated traffic rerouting.

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February 15, 2021
1:00 PM Central Time

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