Automated Recognition and Prediction of Wildfires

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Abstract

Wildfires represent both ecological and economic disasters that significantly affect our planet. The traditional tools to detect fires are not useful in large open areas such as forests. Currently, there is limited work to provide intelligent tools that can assist in understanding, detecting, fighting, or predicting wildfires. Recently, there has been some initiatives to develop such capabilities. However, these initiatives are in the early stage and additional contributions are needed. Our work, using Machine Learning and Pattern Recognition techniques, presents an initial attempt in developing a model that is capable of autonomously recognizing wildfires, determining their size and intensity, and making some prediction about their potential spread. Our initial model is based on convolutional neural networks and utilize images collected from NASA's website combined with the Meteostat library to create a spatiotemporal composite data set. The data include—but not limited to—positional data, fire temperature from the ti4 and ti5 sensors, fire radiative power, and the timestamp information. This data is used to determine the areas in which the fires are burning, along with the strength of the fires, which will eventually allow the system to determine the spread of wildfires. We also hope that this project will increase the awareness of this important problem.

Keywords
Pattern Recognition, Machine Learning, Spatiotemporal Composite Data, and Wildfires.

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Biograph
Dr. Mazin Al Hamando joined Lawrence Technological University in January 2003 as an adjunct professor in the department of Mathematics and Computer Science at the Lawrence Technological University, Southfield, Michigan, USA. At the same time, he held many senior level-consulting positions for various organizations in many industry verticals across the US. Since August 2016, he served as a full-time faculty member, and currently as an Assistant Professor of Practice. Dr. Al Hamando received a Ph.D. in Design Data Management, M.S. in Industrial & Management Systems Engineering, M.S. in Architectural Engineering from The Pennsylvania State University, University Park, PA and BArch from Baghdad University. His teaching and research areas of expertise include the application of machine learning and data mining techniques in various engineering discipline and specifically in design-problem solving. In addition, he developed new programs in the area of software engineering and intelligent web applications for Lawrence Tech.