Comprehensive Dataset Utilizing Meteorological and Topographical Feature Data for Next-Day Wildfire Spread Prediction

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Natural catastrophe modeling allows for the evaluation of economic loss, property loss, and environmental damage during and after such an event. However, two central problems have arisen in the field: the lack of high-quality meteorological datasets and the production of inaccurate spread prediction models. In this research effort, we attempt to solve this by granularizing and aggregating several years worth of data into a comprehensive dataset for the purpose of wildfire spread prediction. Wildfire spread prediction is crucial as wildfires destroy millions of acres of land and produce billions of dollars of economic and insured losses annually. Recently, there has been a marked increase in wildfire severity, duration, and frequency due to a multitude of environmental factors. In being able to model and predict the spread of such wildfires, we allow governments, protection agencies, and insurance companies to mitigate some of these impacts. Available data for wildfire spread prediction is standardized over a base interval of one day and an area of one km2. We are addressing this issue by increasing the granularity and utilizing a base area of 375 m^2 derived from a higher spatial resolution fire mask dataset (VIIRS) and including more feature data that has been scientifically proven to influence wildfire spread(DAYMET). Using this improved dataset, we have built a convolutional long-short-term-memory model (CNN-LSTM) that can be used by environmental protection agencies and insurance companies to properly evaluate the environmental and economic implications that will be caused by such an event, and how they can be minimized.

Awards Won:
Second Award of $2,000