# It's Flaming Out: Using Artificial Intelligence To Emulate Critical Aspects of Wildfire Growth

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Wildfires have caused devastation across the American-West during summer months, eradicating entire belts of natural plant growth and resulting in immense loss of life and property. Furthermore, these disastrous incidents are becoming more commonplace due at least in part to anthropogenic climate change. To help address this growing environmental challenge, this project sought to model the propagation of wildfire perimeters given local meteorological and topographical data and an initial wildfire perimeter, with the ultimate goal of being able to project the spatial extent of a specific wildfire over at least a 24-hour period with a minimum f1-score of 0.7. Requisite data for this project, such as wind-speed-and-direction records, terrain slope, aspect, vegetation, fuel-type, and fire-perimeters, were collected from nationwide datasets. To achieve the target, a novel neural-network architecture was designed and tested. The model received an initial fire perimeter with corresponding environmental characteristics, producing an estimate of the same fire's perimeter a predetermined number of days into the future. In all, the model achieved an unprecedented F1-score of 92.8% and AUC score of 97.3% across 2,688 withheld fire instances, reflecting a high degree of precision and recall across a diverse range of fires. Perimeter predictions were made with relatively low computational runtimes of 568ms. The product of this research project, a complex neural-network capable of modeling changes in wildfire perimeters, satisfied design requirements for model efficiency and accuracy. With further testing, it may provide a modeling tool for firefighting agencies worldwide to better allocate resources and plan fire containment efforts.

**Awards Won:**
Fourth Award of $500
Arizona State University: Arizona State University ISEF Scholarship (valued at up to $52,000 each)
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