FASTCAT: A Predictive Neural Network Based Fire Size Classifier

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The intensity and length of wildfire seasons around the world is increasing, exacerbated by climate-change-related factors such as drought and insect infestation. Fire fighting cost Montana $400 million in 2017 and the United States over $300 billion. The National Fire Danger Rating System (NFDRS) is the current method of fire prediction, classifying danger into five categories (Low - Extreme). NFDRS is time-consuming and resource intensive, often requiring daily sampling of environments, and personnel to classify results into categories. Differential interpretation between areas results in non-uniform classifications. A need exists for a streamlined fire prediction algorithm that can be easily deployed and provide real-time predictions on a national scale. The goal of this project was to make a predictive algorithm (FASTCAT) which utilizes readily available weather and ignitable biomass data to predict potential fire size. FASTCAT accomplishes this by classifying potential fire size into one of three groups via a neural network model. In order to determine the optimal neural network shape for FASTCAT, 12 varying network sizes were trained and compared. FASTCAT's final architecture consists of four hidden layers with 50 nodes each. After training on 120,000 fires, FASTCAT was able to categorize historical fires into size categories with acceptable accuracy. The FASTCAT algorithm can be deployed and run autonomously on the internet without maintenance cost or human intervention. Utilization of FASTCAT would provide a streamlined and accessible fire prediction process, potentially enhancing resource management, decreasing expenses, reducing environmental destruction, and ultimately saving lives.

Awards Won:

Third Award of $1,000