



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Reshma Kosaraju	Project Number J0910
Project Title Application of Meteorological Data to Predict the Chances of a Forest Fire Using Machine Learning and Neural Networks	
<p style="text-align: center;">Abstract</p> <p>Objectives Uncontrolled forest fires are a major problem all around the world due to their devastating effects on humans, ecosystems, and property. The current methods of fire detection have several limitations including timeliness of response, false alarms and cost of operation. The goal of my project is to develop an alternative approach to current methods of wildfire detection that addresses these limitations by analyzing meteorological and other fire index data.</p> <p>Methods A Neural Network model was developed using Machine Learning. The model familiarizes itself with the training data and utilizes logistic regression with binary classification to make predictions on the testing data. The parameters considered include relative humidity, wind speed, moisture content, temperature, burned area, coordinates, day and month, and certain established fire index ratings.</p> <p>Results I successfully developed a Neural Network model which divides the available data into training and testing sets, familiarizes itself with the training set, and tests its predictive power on the testing set. The model is able to predict with accuracy consistently > 60% when evaluated with the testing set.</p> <p>Conclusions My model takes a novel approach to predicting the chances of a forest fire. The model can proactively predict forest fires while current methods are more reactive in nature. The ability to predict a fire before it occurs could lead to saving precious lives and avoiding economic losses which have been estimated to be up to \$350Bn annually in the U.S. alone. The model could also lead to effective firefighting resource management during peak wildfire season. The model utilizes readily available real-world meteorological data and its ability to make predictions is not impacted by weather conditions. This cost-efficient model is automated and the results are easy to interpret while minimizing the chances of human error.</p>	
Summary Statement I built a Neural Network model that is able to learn from and use meteorological data to predict the chances of a forest fire.	
Help Received I built the Neural Network model myself. I took an online Coursera course (taught by Andrew Ng) to learn how to build Neural Networks.	