



FOREST FIRE

Montesinho Natural Park



INTRODUCTION

- One major environmental concern is the occurrence of forest fires (also called wildfires), which affect forest preservation, create economical and ecological damage and cause human suffering. Such phenomenon is due to multiple causes (e.g. human negligence and lightnings) and despite an increasing of state expenses to control this disaster, each year millions of forest hectares (ha) are destroyed all around the world.



INTRODUCTION

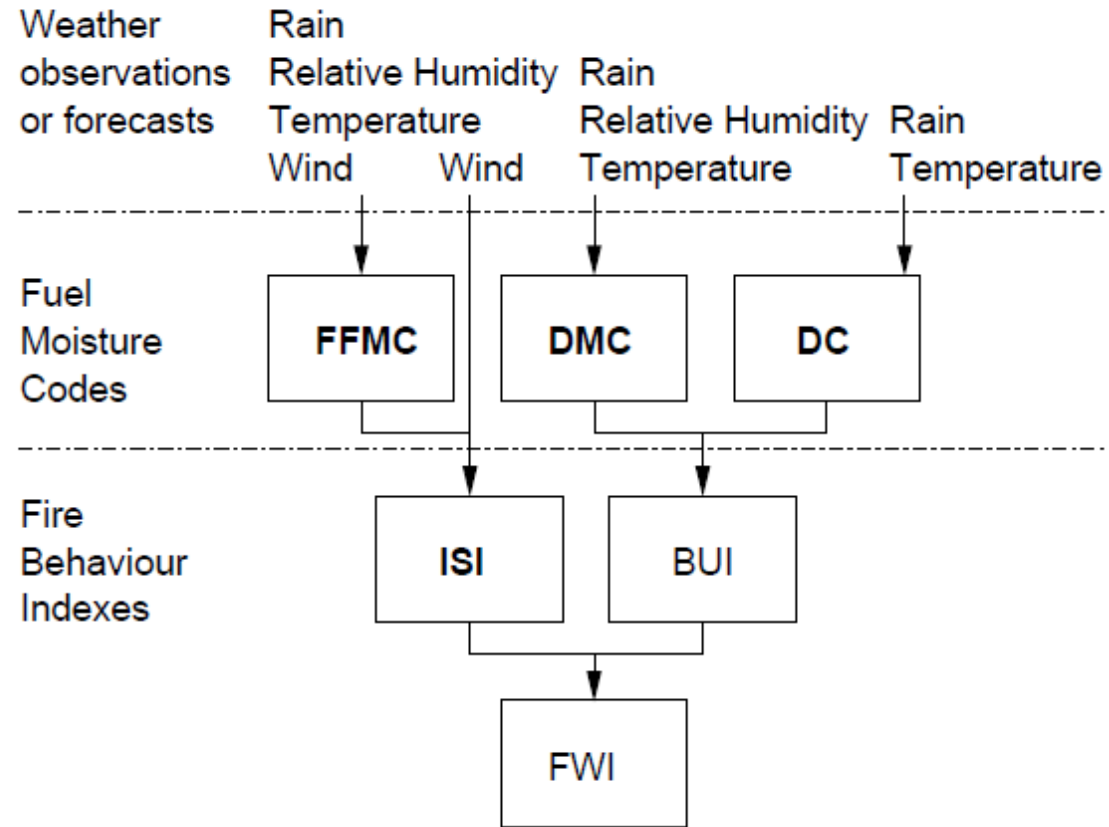
- This study will consider forest fire data from the Montesinho natural park, from the Trás-os-Montes northeast region of Portugal.
- This park contains a high flora and fauna diversity.
- At a daily basis, every time a forest fire occurred, several features were registered, such as the time, date, spatial location within a 9×9 grid (x and y axis)



Forest Fire Data

- The forest Fire Weather Index (FWI) is the Canadian system for rating fire danger and it includes six components
- Fine Fuel Moisture Code (FFMC), Duff Moisture Code (DMC), Drought Code (DC), Initial Spread Index (ISI), Buildup Index (BUI) and FWI.
- The first three are related to fuel codes: the FFMC denotes the moisture content surface litter and influences ignition and fire spread, while the DMC and DC represent the moisture content of shallow and deep organic layers, which affect fire intensity. The ISI is a score that correlates with fire velocity spread, while BUI represents the amount of available fuel. The FWI index is an indicator of fire intensity and it combines the two previous components.

Forest Fire Data





Attribute Description

- **X** x-axis coordinate (from 1 to 9)
- **Y** y-axis coordinate (from 1 to 9)
- **month** Month of the year (January to December)
- **day** Day of the week (Monday to Sunday)
- **FFMC** - Fine Fuel Moisture Code
- **DMC** - Duff Moisture Code
- **DC** - Drought Code
- **ISI** - Initial Spread Index
- **temp** Outside temperature (in °C)
- **RH** Outside relative humidity (in %)
- **wind** Outside wind speed (in km/h)
- **rain** Outside rain (in mm/m²)
- **area** Total burned area (in ha)



Solution

- The proposed solution, which is based in a SVM and requires only four direct weather inputs (i.e. temperature, rain, relative humidity and wind speed) is capable of predicting small fires, which constitute the majority of the fire occurrences.
- The drawback is the lower predictive accuracy for large fires.
- Since we mainly concentrate on EDA, we would try and see how different visualizations look in the Python notebook.

Citation Request:

- This dataset is public available for research. The details are described in [Cortez and Morais, 2007].

Please include this citation if you plan to use this database:

[Cortez and Morais, 2007] P. Cortez and A. Morais. A Data Mining Approach to Predict Forest Fires using Meteorological Data. In J. Neves, M. F. Santos and J. Machado Eds., New Trends in Artificial Intelligence, Proceedings of the 13th EPIA 2007 - Portuguese Conference on Artificial Intelligence, December, Guimarães, Portugal, pp. 512-523, 2007. APPIA, ISBN-13 978-989-95618-0-9. Available at: [\[Web Link\]](#)