

# Forest Fire Spread Prediction Using Remote Sensing Technology

Harikesh<sup>1</sup> and Dr. Sanjeev Srivastava<sup>1</sup>

<sup>1</sup> University of the Sunshine Coast, Queensland, Australia

## An empirical and dynamic tool for Prediction of Forest Fire Spread Using Remote Sensing and Machine Learning Technique

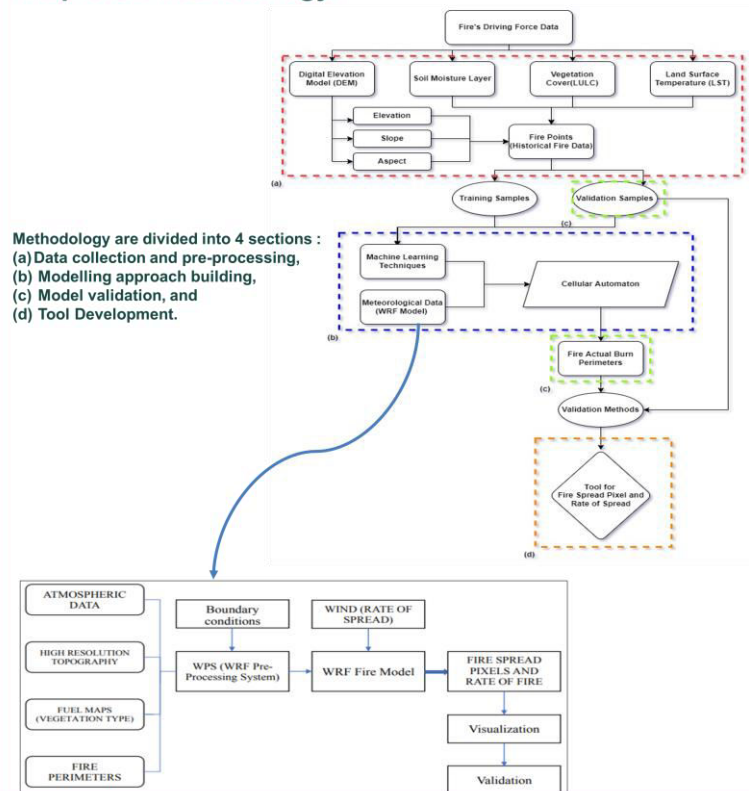
### Introduction

- ❑ Forest fires are regarded as one of the most pervasive threats in a forested environment. This is one of the most prevalent forest disturbances for every continent.
- ❑ The vegetation in Australia is influenced and shaped by forest fires, due to the diverse varieties of floral composition, undulated terrain and a varied climate pattern, the vegetation in Australia
- ❑ In Australian ecosystems, fires can be managed well with the use of modern advanced technologies and development various forest fire spread models. The current advancements in machine learning, computer vision, artificial intelligence, and space application technologies provide new techniques for detecting and monitoring forest fires that are more effective at identifying active forest fires.

### Aims

- Simulate forest fire spread scenarios by using machine learning.
- To Develop a Empirical and Dynamic Tool for Forest Fire Spread Prediction.

### Proposed Methodology:



### Data Required

#### ➤ Fuel Distribution

- ❑ Vegetation Types and their fire requirements
- ❑ Time Since last burn
- ❑ Fuel accumulation according to vegetation types
- ❑ Fuel condition (moisture etc.)
- ❑ Fuel continuity (widespread distribution or scattered)

#### ➤ Physical Factors

- ❑ Topography (elevation, slope, aspect etc.)
- ❑ Weather conditions (local fire danger index)

### Research Question

- What kind of simulated data can we use to achieve a good performance and replicate as close as possible a satellite dataset?
- What is the mechanism of forest fire spread and role of different parameters which influence forest fire spreading.

### Expected Result

- Using the Extreme Learning Machine (ELM), it will use to find that each cell's igniting probability with accurately predicted, as well as the effect of wind velocity on the fire spreading pattern.
- Dynamic GUI Tool for Forest Fire Spread result visualization

### References

- Dai, J., Zhai, C., Ai, J., Ma, J., Wang, J., & Sun, W. (2021). Modeling the spread of epidemics based on cellular automata. *Processes*, 9(1), 1–13. <https://doi.org/10.3390/pr9010055>
- Hogeweg, P. (1988). Cellular Automata as a Paradigm for Ecological Modeling.
- Karafyllidis, I., & Thanailakis, A. (1997a). A model for predicting forest fire spreading using cellular automata. In *Ecological Modelling* (Vol. 99).