



DATA  
SCIENCE

# Wildfire Prediction



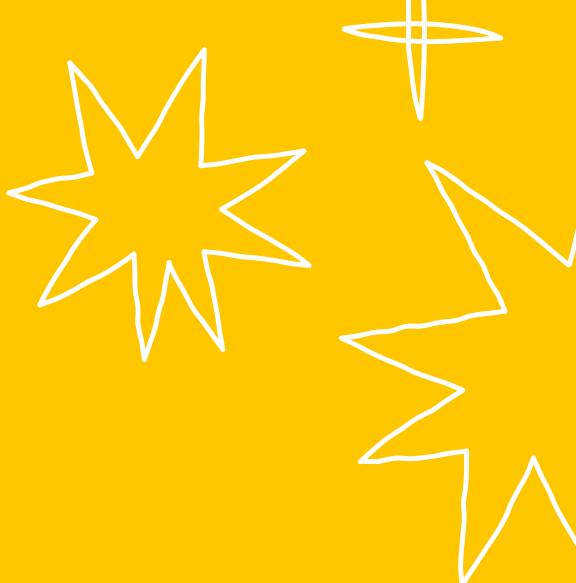
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# Why is it such a hot topic ?

Climate change is more than just weather shifts; it's a global crisis. Rising temperatures intensify extreme weather, threaten our food sources, and endanger coastal communities. As ecosystems falter, we risk losing vital services like clean water and air. For the sake of our health, economy, and future, addressing climate change is imperative.

# What's wildfire ?



A wildfire is an uncontrolled and unplanned fire burning in combustible vegetation like forests, grasslands, and brushlands.



## Wildfire: A Threat to Nature and Communities

1. Devastating Ecosystem Impact:
2. Air Pollution and Health Risks:
3. Economic Loss and Infrastructural Damage:
4. Threat to Human Safety and Displacement:
5. Long-Term Social and Psychological Impacts:





# Problem Statement

Can deep learning models accurately predict wildfire growth and spread patterns from real-time images, enabling faster response and resource allocation?



# Objective

Develop a deep learning model that effectively predicts wildfire behavior based on images, aiding in proactive mitigation strategies and reducing associated damages.



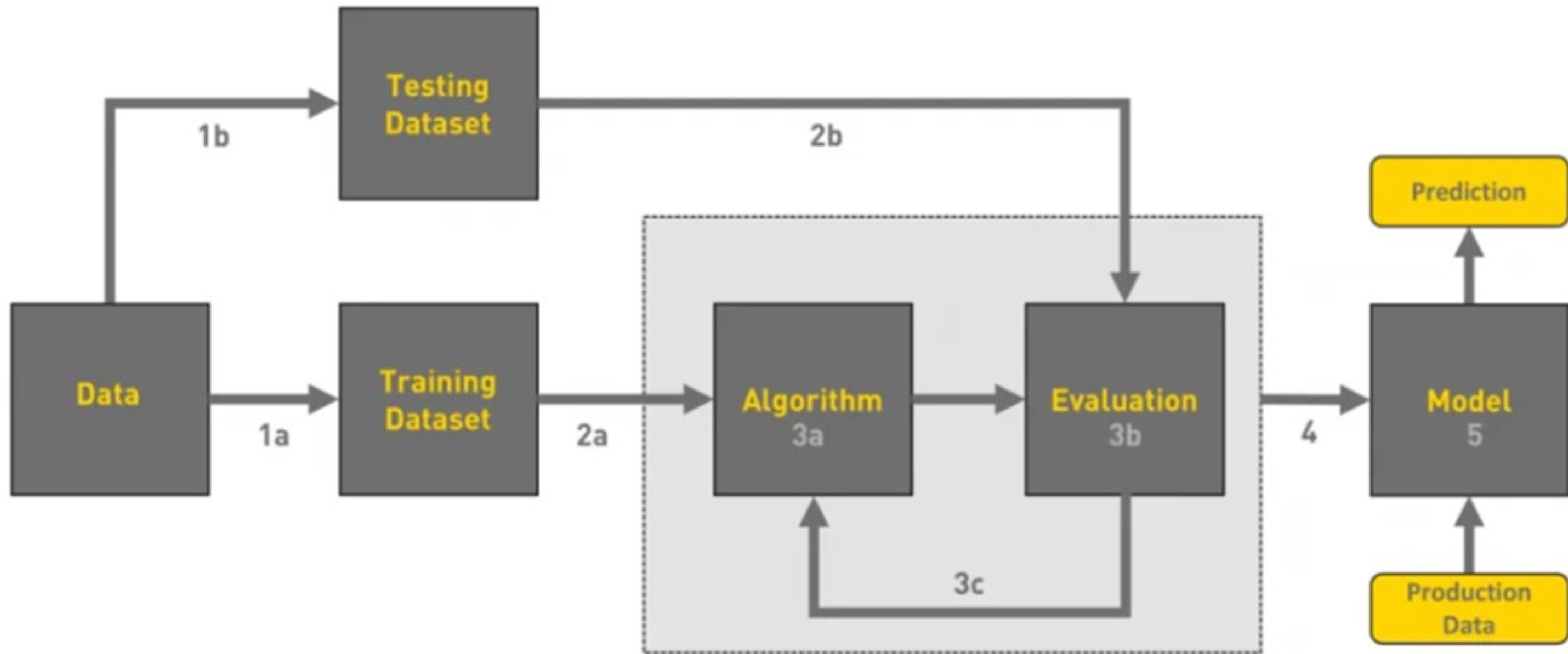
# Dataset Overview

- Data Source: Merged two real-time datasets from Kaggle, exceeding 13,000 diverse images.
- Image Diversity: Covers wildfires across various types of terrain, including forests, bushes, and grasslands, enhancing model generalizability.
- Real-Time Acquisition: Enables continuous model training and adaptation to evolving wildfire dynamics.
- Large-Scale: Provides sufficient data for robust model training and reduces the risk of overfitting.
- Potential: This dataset paves the way for highly accurate and versatile wildfire prediction systems.



# WORK FLOW DIAGRAM

Overview of the Workflow of ML



# Modeling and *prediction*

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VGG16 emerged as the best performing model for wildfire prediction, demonstrating high accuracy and low loss. Further optimization and exploration can be planned to enhance the model's capabilities and contribute to effective wildfire management.

**CNN**

The basic CNN model performed poorly due to its limited complexity for this task.

**RESNET  
50**

ResNet50 achieved high accuracy but suffered from high loss, indicating potential overfitting.

**VGG16**

VGG16 achieved a sweet spot of high accuracy and low loss, suggesting good generalization and robustness.

# Conclusion

- Data Exploration: We conducted a thorough exploratory data analysis (EDA) using an Excel spreadsheet, allowing us to understand the characteristics and distribution of the combined wildfire dataset.
- Model Development: We experimented with various deep learning models, including a basic CNN, ResNet50, and VGG16.
- Best Model: VGG16 emerged as the best model, achieving an impressive 90% accuracy in wildfire prediction.
- Real-Time Prediction: VGG16 demonstrates remarkable accuracy when predicting wildfires from images uploaded via the web interface.



# Thank You!

This project's findings pave the way for a future where technology empowers proactive wildfire management, safeguarding communities and ecosystems. By harnessing the power of deep learning, we can build a safer and more resilient future in the face of wildfire threats.