Group 73 Final Report:
Wildfire Detection Classification Plan

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1 Introduction

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2 Dataset

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3 Features and Inputs

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4 Implementation

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5 Evaluation

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6 Progress

The original plan was to evaluate the current wildfire detection model and identify areas for improvement. We initially focused on three key aspects: efficiency, accuracy, and mobility. Accuracy was the most straightforward area to target, since increasing correct predictions—especially reducing false negatives—is critical for wildfire detection. Efficiency mattered because a faster model reduces resource usage and shortens the time needed to confirm whether a wildfire has begun. Mobility was also important, as we wanted to explore whether the model could eventually be deployed on more portable and cost-effective hardware rather than relying on expensive systems.

To follow through on this plan, we implemented and compared three different models—ResNet18, EfficientNet, and MobileNet—using the same dataset. Each model was chosen because it excels in one of the improvement categories. Based on feedback from my previous progress report, We also incorporated additional evaluation metrics, such as ROC/AUC, to better capture the strengths

and weaknesses of each approach.

However, the plan shifted slightly during the process. After running the models, it became clear that more detailed error analysis was needed, especially to address the high rate of false negatives. Because of this, the direction of the project moved from general improvement across multiple categories to a more targeted focus on understanding and reducing misclassifications.

7 Error Analysis

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Data Description: missing class distribution details

Implementation: missing architectural details

Evaluation: limited error analysis, missing ROC/AUC

Feedback and Next Step: no strategy for addressing false negatives.

Sapna: Overall, good work!

Team Contributions

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References

[1] National Aeronautics and Space Administration. 2025. Wildfires and climate change. Web page. Available at https://science.nasa.gov/earth/explore/wildfires-and-climate-change/. Accessed: 2025-11-09.

[2] Alfred V. Aho and Jeffrey D. Ullman. 1972. *The Theory of Parsing, Translation and Compiling*, volume 1. Prentice-Hall, Englewood Cliffs, NJ.

[3] Arize AI. 2023. Binary cross entropy: Where to use log loss in model monitoring. https://arize.com/blog-course/binary-cross-entropy-log-loss/. Published January 30 2023.

[4] American Psychological Association. 1983. *Publications Manual*. American Psychological Association, Washington, DC.

[5] Galen Andrew and Jianfeng Gao. 2007. Scalable training of L1-regularized log-linear models. In *Proceedings of the 24th International Conference on Machine Learning*, pages 33–40.

[6] Health Canada. 2024. Human health effects of wildfire smoke — report summary. Web document. Available at https://www.canada.ca/en/services/health/healthy-living/environment/air-quality/wildfire-smoke/human-health-effects-report-summary.html. Accessed: 2025-11-09.

[7] Ashok K. Chandra, Dexter C. Kozen, and Larry J. Stockmeyer. 1981. Alternation. *Journal of the Association for Computing Machinery*, 28(1):114–133.

[8] Dan Gusfield. 1997. *Algorithms on Strings, Trees and Sequences*. Cambridge University Press, Cambridge, UK.

[9] Mohammad Sadegh Rasooli and Joel R. Tetreault. 2015. Yara parser: A fast and accurate dependency parser. *Computing Research Repository*, arXiv:1503.06733. Version 2.

[10] Laxita Soontha and Mohammad Younus Bhat. 2026. Global firestorm: Igniting insights on environmental and socio-economic impacts for future research. *Environmental Development*, 57. Accessed: 2025-11-10.