# Fire and Smoke Detection using CNNs trained with Fully Supervised methods and Search by Quad-Tree

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Overview

In this work we use aerial images taken from drones of wildfires to **detect fire and smoke** using **convolutional neural networks**. To solve the **multi-scale detection problem** we use a **Quad-Tree method** in the search task. The proposed system shows a good performance in **real drone aerial images**.

Methods
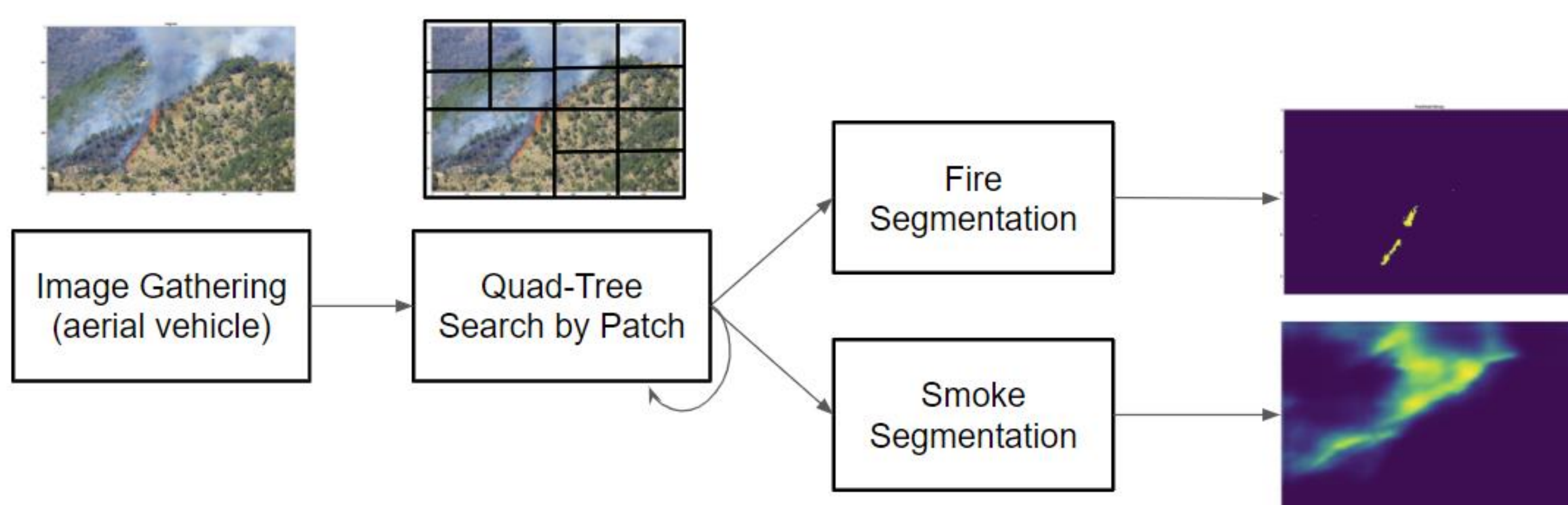
The aerial images taken by a drone are **dynamically** sliced in **patches** by the **Quad-Tree Method.** Those patches are then used to do the **smoke/fire detection** involving a **classification** and **segmentation** stage.

Quad-Tree
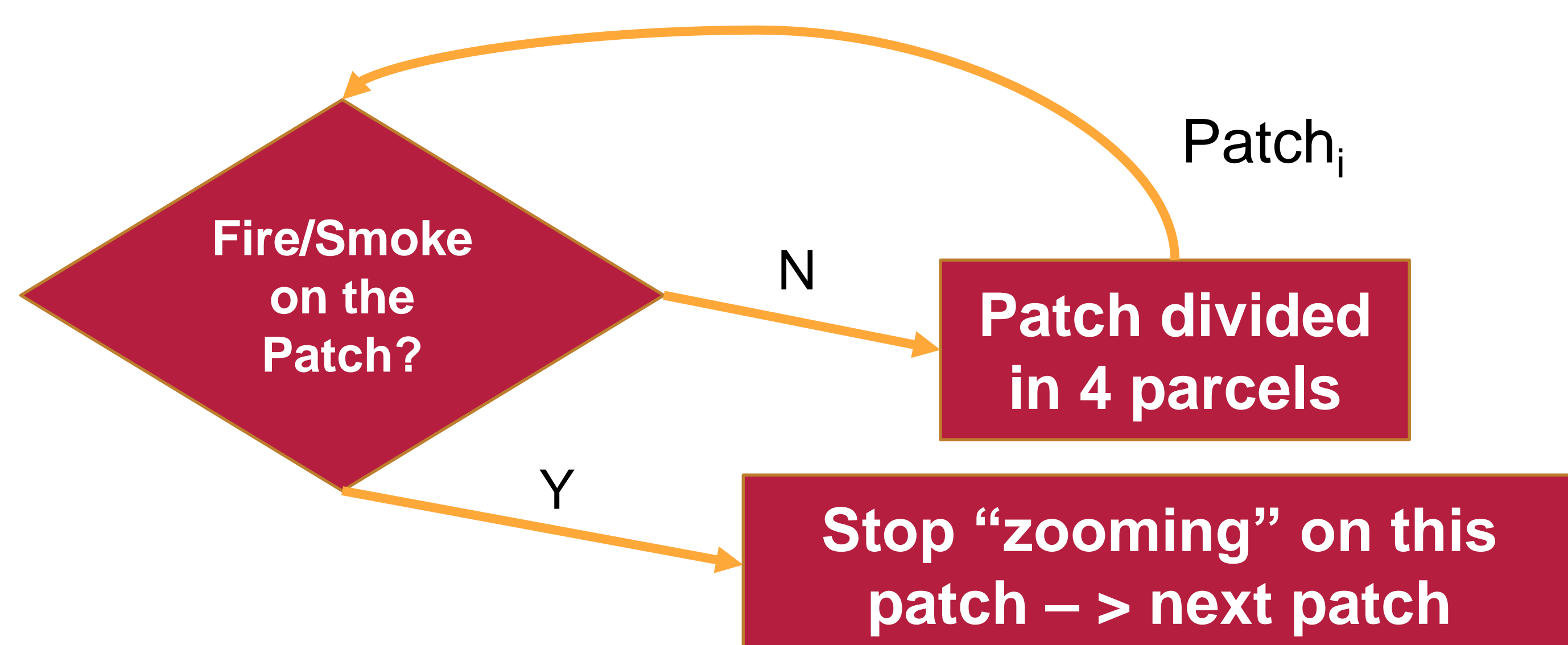
Classification (SqueezeNet)

Each patch is **evaluated** (contains fire/smoke?) using **SqueezeNet** (classification CNN) to reduce the number of false detections on segmentation. If the patch **contains fire/smoke** the patch moves to segmentation phase.
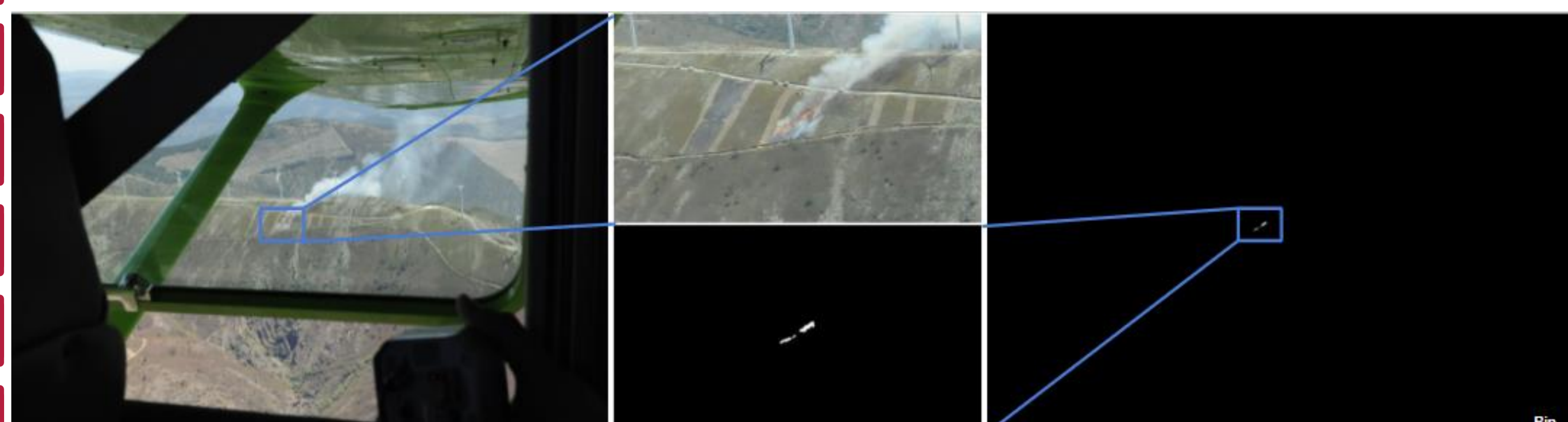
Segmentation (U-Net)

Using **U-Net** (**segmentation** CNN) we do the classification of the **areas of the patches** containing the fire/smoke classes.

Results

Performance on a test set:

	Avg. IoU	Pixel Accu.
Fire Class	0.8692	0.8348
Smoke Class	0.8404	0.7519