

of these images are natural images that do not contain fire areas. 1141 of them consist of images containing fire area. The experiments were carried out in three stages. The first stage is the image processing stage. The second stage is the motion detection stage. The third phase is the training and testing phase of the CNN model.

### 3.1. Extraction of the flame region from the image with image processing

Various filters were applied sequentially on the image in order to extract the flame region from the image. These filters were applied to 3041 images with and without fire zones. From all images containing the fire zone, the flame zone was extracted with 100% success. However, some parts of the images that do not contain a fire zone are marked as a flame zone. The sample images used in the experiments and the flame zones extracted as a result of the filters applied are shown in Figure 4.



environment. However, with this method, the presence of a moving object in the environment is detected and sent to the decision system. Together with the 1st and 3rd phases of the fire detection framework, this phase helps in the detection of fire. Via a video, the movements of the flame are detected and the moving areas are marked. Sample images obtained from the experiments are shown in Figure 5.

