



Fig. 3. Cross validation

3. Experimental Results

This section shows the experimental results and comparison of image processing, motion detection and CNN models. Experiments were carried out using the dataset created by combining different datasets. All experiments were performed on a NVidia GeForce GTX 1650Ti with 4GB RAM, Intel Core i5 10200H processor and 16GB RAM computer. Image processing and motion detection Python programming language is used. Tensorflow deep learning framework was used in CNN experiments. In the training and testing of the CNN model, the dataset was not divided into parts, instead the cross-validation method was used. The dataset contains 3041 images in total. 1900

with reduced brightness. Figure 4 (c) shows the images passed through the HSL filter. Figure 4 (d) shows the images passed through the YCbCr filter. Figure 4(e) shows the images passed through the median filter. Figure 4 (f) shows the images passed through the herbaceous filter. In Figure 4 (g), the edges of the extracted flame region are determined. After the last stage, it is decided that the flame exists.

3.2. Detection of flame motion with motion detection

Fire flames are in constant motion. For this reason, the mobility feature of the flame can be used in the fire detection stages. The movements of the flame were detected on the live images. Besides the flame, there may be different moving objects in the