Experiment No 6: Image Forgery Detection using Machine Learning

Aim

To detect and classify forged images using machine learning techniques with OpenCV and Python.

Software Required

- Python
- OpenCV
- NumPy
- Scikit-learn
- Matplotlib

Theory

Image forgery refers to the manipulation of digital images to conceal or falsify information. Common forgery techniques include copy-move forgery and splicing. Image forgery detection aims to determine whether an image is authentic or tampered.

Machine learning techniques are used to classify images as forged or genuine by learning discriminative features extracted from images such as texture, edges, and frequency-domain information.

Methodology

The process of image forgery detection using machine learning involves the following steps:

- Image preprocessing
- Feature extraction
- Training a machine learning classifier
- Image classification (forged or authentic)

Algorithm

1. Collect a dataset of original and forged images.

2. Convert images to grayscale and resize them.

3. Extract relevant features from images.

4. Label the images as forged or authentic.

5. Train a machine learning classifier using the extracted features.

6. Test the classifier with unseen images.

7. Classify the image as forged or genuine.

Pseudo Code (Python Style)

1. Load dataset of images

2. **for** each image in dataset:

   - Convert image to grayscale
   - Resize image to fixed dimensions
   - Extract features (edges, texture, etc.)
   - Store features and corresponding label

3. Split dataset into training and testing sets

4. Train machine learning classifier (e.g., SVM or Random Forest)

5. **for** each test image:

   - Extract features
   - Predict class using trained model

6. Display classification result

Example

Consider a dataset containing both original and forged images. A forged image may contain duplicated regions due to copy-move forgery. By extracting texture and edge-based features, the machine learning classifier learns patterns that distinguish forged images from genuine ones and classifies them accordingly.

Applications

- Digital forensics

- Fake image detection in social media

- Legal evidence verification

- Image authentication systems

Result

Thus, image forgery detection was successfully implemented using machine learning techniques, and the images were accurately classified as forged or authentic.