

Name: Kashish Srivastava

Entry number: 2024AIB2289

Approach: For identifying similar image pairs in the dataset, we used a combination of preprocessing, feature extraction and similarity score.

Preprocessing

For image noise reduction, we opted for Median Blur rather than Gaussian Blur. For feature extraction, median blur efficiently manages salt-and-pepper noise and maintains edge details. Although it works well for broad smoothing, Gaussian Blur has the potential to lose crucial information by blurring small edges and structural features which we observed during testing.

Feature Extraction

To extract features, we used a ResNet model. ResNet is ideally suited to extracting hierarchical characteristics from photos because of its residual connections. We obtained strong, high-dimensional representations of the images by extracting embeddings from an intermediate layer using a pre-trained ResNet model.

Similarity score

Rather than using Manhattan or Euclidean distances to calculate similarity between image pairs, we choose to use Cosine Similarity. Cosine Similarity is less susceptible to changes in feature magnitude since it assesses the angular similarity of feature vectors. Manhattan and Euclidean distances, on the other hand, are less dependable for this purpose since they are susceptible to outliers and magnitude variations.

Running code

Install dependencies: `pip install -r requirements.txt`

Run script: `python similarity.py /path/to/Imagefolder/`

Result:

Similarity between image 1 and image 2: 0.7273083

Similarity between image 1 and image 4: 0.7289478

Similarity between image 2 and image 3: 0.8995426

Similarity between image 1 and image 5: 0.6700382

Similarity between image 1 and image 6: 0.9988342

Python code link: <https://owncloud.iitd.ac.in/nextcloud/index.php/s/726gmMZaC2RmayA>