Ecole Supérieure Informatique Sidi Bel Abbes

Second Cycle

Computer Vision

LAb -4-: Image Classification Using Deep Features

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1. **Objective:**

   - Extract deep features from images using two pre-trained models, VGG16 and ResNet, and use these features for image classification to compare their performance.

2. **Programming Language and Library**

   - UC Merced Land Use Dataset.
   - Python with OpenCV and scikit-learn libraries.
   - TensorFlow: For deep learning models.

3. **Lab Procedure:**

   - Data Loading and Preprocessing (15 minutes):
   - Dataset Splitting:
     - Split the dataset into a training set and a testing set. A common split ratio is 80% for training and 20% for testing.
     - Ensure that the split maintains a balance of images from different categories.
   - **Deep Feature Extraction :** For each image in the dataset:
     - Steps to Extract Deep Features:
     - Load VGG16 model without the final classification layer.
     - Process the image through the model to obtain feature descriptors.
     - Extract the output from the last fully connected layer.
     - Store the extracted features for each image.
   - Classifier Training:
     - Train a classifier (Support Vector Machine) using the extracted deep features and the corresponding class labels.
   - Generate Predictions:
     - For each test image, extract features, and use the trained classifier to predict the class.
   - Performance Evaluation:
     - Compute accuracy to evaluate the SVM classifier's performance.
     - Draw and include the confusion matrix in your lab report.

4. **Assignment:** Provide a report on the outcomes.

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