Assignment for

Machine Learning Engineer

Objective

The objective of this assignment is to demonstrate proficiency in solving a computer vision problem using handcrafted features and shallow learning models. By implementing various preprocessing techniques and extracting handcrafted features, candidates should gain insights into how different features contribute to image classification tasks. The assignment also includes developing a Flask application for image classification.

Dataset Link

https://drive.google.com/file/d/1lWgKokYUrD5PPMO3tCy-yMN2ytaSnjTV/view?usp=sharing

Assignment Components

1. Data download and preprocessing.
2. Feature extraction : You need to take multiple sets of handcrafted features, keep 3 features at least in a feature set. The features can be Low-level Vision: Histogram and Histogram equalisation, Gray-scale transformation, Image Smoothing, Connected components in images. Mid-level Vision: Edge Detection using Gradients, Sobel, Canny; Line detection using Hough transforms; Semantic information using RANSAC; Image region descriptor using SIFT etc.
3. Dimensionality reduction if needed.
4. Classification algorithm of your choice with explanation.
5. Evaluation components.
6. Flask app: One should be able to upload an image and get the classification result.

Deliverables

1. Explain image preprocessing steps.
2. Explain the importance of your selected feature sets for this image classification task.
3. Apply appropriate techniques for dimensionality reduction, if your feature set size is too large and explain that.
4. Evaluation of the trained models using appropriate metrics.
5. Comparison of results obtained from different feature sets.
6. Development of a Flask application with image upload functionality for classification from best performing model.
7. Guide on setting up a Flask application for local image classification.
8. Enhancement scope to improve the performance of the model, also is there any way we can automate the feature extraction process.

Note

- Do not use CNN/RNN for this assignment..
- Push code to GIT repository.