

Image Classification

- Introduction

This project focuses on image classification using different machine learning and deep learning models. The goal is to classify images into three categories: pretty sunflower, rugby ball leather, and ice cream cone.

- Data Collection

The data was collected using the Bing Image Downloader Python library, with a total of 60 images for each category. The images were downloaded and stored in separate folders for each category.

- Data Preprocessing

Images were resized to a consistent shape (150x150x3) to ensure uniformity across the dataset. The pixel values were flattened to create a feature vector, and the target labels were assigned based on the categories.

- Model Training and Evaluation

1. Decision Tree Classifier

- Decision Tree Classifier was trained on the dataset.
- Accuracy and confusion matrix were used to evaluate the model's performance.

2. Naive Bayes Classifier

- Gaussian Naive Bayes was employed for classification.
- Accuracy and confusion matrix were used for evaluation.

3. Random Forest Classifier

- Random Forest Classifier was trained using an ensemble of decision trees.
- Cross-validation scores and confusion matrix were analyzed.

4. Logistic Regression

- Logistic Regression was used with hyperparameter tuning.
- Cross-validation scores, accuracy, and confusion matrix were examined.

5. Support Vector Machine (SVM)

- SVM with a grid search for hyperparameter tuning was implemented.
- Accuracy, confusion matrix, and classification report were assessed.

6. Deep Learning Model (TensorFlow/Keras)

- A neural network with a sequential model was created.
- The model was trained and evaluated using the TensorFlow/Keras library.

Model Deployment

The best-performing model was saved using the Pickle library for future use. The model can be loaded and used for making predictions.

Prediction Using the Deployed Model

The deployed model was tested with new images fetched from URLs. The user can input an image URL, and the model will provide predictions for the given image.

Conclusion

The project explores various machine learning and deep learning models for image classification. Each model's performance is assessed, and the best-performing model is saved for future use.