



Trinity College Dublin, The University of Dublin
School of Computer Science and Statistics
CVPR Lab, Dublin 2, Ireland

CS7GV1: Computer Vision

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Assignment #03

Objective: Build, train, and evaluate a CNN model to classify images using a publicly available dataset.

Task Overview:

1. **Dataset Selection:** Use a dataset like CIFAR-10, MNIST, or Fashion-MNIST.
2. **Preprocessing (4 Points):**
 - Load and explore the dataset.
 - Normalize pixel values (scale to $[0, 1]$).
 - Apply data augmentation techniques like rotation, flipping, etc. to increase dataset diversity.
3. **Model Building (4 Points):**

Design a CNN with:

 - At least 3 convolutional layers.
 - Pooling layers to reduce dimensionality.
 - Dropout and batch normalization for better performance.

Use ReLU activation and a softmax output layer for classification.
4. **Training (4 Points):**
 - Split the dataset (e.g., 80% training, 20% validation).
 - Train the model for at least 10 epochs using an optimizer (e.g., Adam or SGD).
 - Monitor and record training and validation accuracy/loss.
5. **Evaluation (4 Points):** Evaluate the model on the test set and generate:
 - Classification accuracy, precision, recall, and F1-score.
 - A confusion matrix.
 - Training and validation loss/accuracy plots.
6. **Hyperparameter Tuning (4 Points):** Experiment with optimizers, learning rates, and model depth to improve performance. Document your findings in comments.

Bonus Challenges (Optional):

1. Implement transfer learning with a pre-trained model (e.g., ResNet or VGG) and compare it with your custom CNN.

Deliverables: Submit a **Jupyter Notebook** with name ***StudentID_assignment_3***

***** There will be a Plagiarism check on your Python code *****

Date of Submission: 6th December 2024

Submissions after the deadline will not be considered.