



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.*

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**Task Overview:**

1. **Dataset Selection:** Use a dataset like CIFAR-10, MNIST, or Fashion-MNIST.
2. **Preprocessing (20 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 (20 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 (20 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 (20 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 (20 Points):** Experiment with optimizers, learning rates, and model depth to improve performance. Document your findings in comments.

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**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: 5<sup>th</sup> December 2025**

**Submissions after the deadline will not be considered.**