CCS3113 Deep Learning

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Project: Hand Writing Recognition

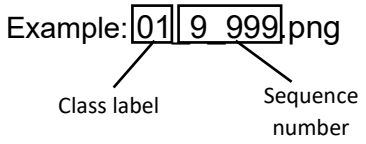
1. Introduction and Objective

The Global Intelligence Authority (GIA) frequently receives anonymous handwritten notes linked to criminal investigations. To support their forensic teams, they require a reliable system capable of identifying the writer of a handwritten document. As a data scientist, your task is to develop a deep learning model that can classify handwriting samples according to the writer. This project aims to give you hands-on experience in building, training, and evaluating a deep learning model using real-world data.

2. Dataset Description

A complete dataset has been provided for this project. It includes:

Training Dataset (train/):
Contains labeled handwriting images. You will need to extract the class labels from the filenames. The first two characters of each filename represent the class label (writer ID).



Test Dataset (test/): Test images are names in the same manner as training images.

Hold-out Test Dataset: There is another set of test images similar to the above test dataset hold-out for final evaluation of your model

3. Project Tasks:

a) Develop a deep learnig model to classify the images. You are not allowed to use test image labels for training purpose. Test images are given only for evaluating the performance of your model
b) You are encouraged to pre-process the dataset as needed without changing the test files.
c) Save your trained model as a file named as: **model.keras or model.h5** (if using keras/tensorflow) or any other extension depending on your chosen framework
d) For deployment, write a python script (NOT Jupyter notebook) to run on local Windows based system without GPU to:
    i. Read the test images from the test folder as input
    ii. Load your saved model
    iii. Show the average **accuracy** for all the test images.
    iv. Save the **test image filenames, actual class labels and the predicted class labels** in a CSV file. The filename must be set as: **result.csv**
    v. Save your script as: **run.py**

4. Project Deliverables:

a) Training code as a python script, filename: **train.py**
b) Trained model, filename: **model.<extension>**
c) Test script, filename: **run.py**
d) A URL to your video presentation (max 5 min) covering the following:
   i. Pre-processing steps
   ii. Feature engineering (if any)
   iii. Network structure used
   iv. Average accuracy on test dataset
e) A 1-page report summarizing your video presentation

5. **Rules:**

a) You are allowed to use deep learning models (Neural Nets) only. Usage of any other type of machine learning models at any stage of your project is not allowed
b) You may use Jupyter. But make sure you save and submit all the project deliverables as **python script that can run locally on a Windows system without internet and without GPU**
c) You may use Generative AI for coding assistance.
d) It is your responsibility to ensure that your code run on the final evaluation computer (Core i5, 16GB RAM, Windows 11, no GPU and internet connection) and your video is accessible till the official end of the semester.

e) Submission Deadline: **January 4, 2026**
a) Groups are required to attend a project review session if instructed.
f) Each day of delay will have a penalty of 2 marks. Each week of early submission will have 2 bonus marks (max 4 marks)
g) I will be available for discussion on the project till December 18, 2026

Grading Rubric:

Criteria	Description	Marks
1. Preprocessing & Data Handling	Correct extraction of class labels, proper preprocessing, correct train/test file handling, correct feature engineering (if needed)	**6**
2. Model Development & Training Quality	Appropriate neural network architecture, correct training procedure, reasonable hyperparameters, efficient model size for CPU inference.	**5**
3. Deployment Script (run.py)	Script runs correctly on Windows CPU, loads model, processes test images, outputs result.csv, and follows all project constraints.	**4**
4. Accuracy & Experimental Performance	Performance of the model on hold-out test set	**3**
5. Presentation & Report Quality	Clarity of the video, explanation of workflow, and quality of the 1-page summary report.	**2**