

	<p>IIT KHARAGPUR AI4ICPS I HUB FOUNDATION</p> <p>Hands-on Approach to AI, Cohort-2, July – October 2024</p> <p>Programming Assignment 4: DL Applications in Computer Vision</p>
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Due date: Friday 13th September 2024, EOD – IST

Important Instructions about Programming Assignments

1. Programming assignments will be evaluated automatically. **Do not** change the skeleton code provided to you.
2. Write your code **only in the designated places** in the skeleton code and process the input data provided to you in the designated variables. **Do not alter** the input-output structure in the skeleton code.
3. **Do not import** any additional libraries. **Do not use any additional files** for the processing (other than those mentioned in the skeleton code).
4. Failure to comply with these instructions may lead to you getting **zero marks** for the assignment, even if the solution is largely correct.

Objective: This assignment has two objectives:

1. Understanding how to implement Image Classification model using PyTorch.
2. Develop a pipeline to solve the MNIST classification problem and output model accuracy.

Problem: Write a Python program using the provided template to train and test a partial MNIST dataset using a modified AlexNet as shown below. The program should accept three integers as command line input. First two integers define the labels of the two-class classification and third integer represents the number of epochs for training. Output only the final model accuracy and nothing else.

Feature Extractor:

Layer	Filters	Filter Size	Stride	Padding	Feature Size	Activation
Input					$1 \times 28 \times 28$	
Conv2D	32	5	1	1	$32 \times 26 \times 26$	ReLU
Conv2D	64	3	-	1	$64 \times 26 \times 64$	ReLU
MaxPool2D	-	2	2	-	$64 \times 13 \times 13$	-
Conv2D	96	3	-	1	$96 \times 13 \times 13$	ReLU
Conv2D	64	3	-	1	$64 \times 13 \times 13$	ReLU
Conv2D	32	3	-	1	$32 \times 13 \times 13$	ReLU
MaxPool2D	-	2	2	-	$32 \times 12 \times 12$	-

Classifier:

Layer	Feature Size	Activation
Dropout	4608	
Linear	2048	ReLU
Dropout	2048	

Linear	1024	ReLU
Linear	10	

Note: Even if there are two classes, we output 10 features in the last Linear layer for correct mapping.

Instructions: Download the dataset along with template program and write your code in the designated location mentioned in the comments only. **You are required only to write the sequential model for feature extractor, classifier and forward (feature extractor THEN classifier). The dataset must be in the current working directory with the structure [data/MNIST/raw/*](#).** You should read the skeleton code to understand the exact mechanism of input from the command line and provide the required output. To train and test modified AlexNet with 1 and 2 MNIST classes with 4 training epochs, the command line input should be: [python assignment.py 1 2 4](#)

Execution Syntax: `python assignment.py <number> <number> <number>`

Sample Test Cases:

Input	4 5 3	1 2 3	1 2 2	4 9 3	8 7 5
Output	97.97	97.52	78.10	79.41	95.21