Introduction to Machine Learning (Spring 2019)

Homework #2 (40 Pts, April 29)

Student ID _____

Name _____

Instruction: We provide all codes and datasets in Python. Please write your code to complete the softmax classifier. Compress 'models/SoftmaxClassifier.py' and submit with the filename 'HW2_STUDENT_ID.zip'.

(1) [20 pts] Implement five functions in 'models/SoftmaxClassifier.py'. ('train', 'eval', 'softmax_loss', 'compute_grad' and '_softmax' respectively). Copy 'optim/Optimizer.py' from the previous assignment if you have implemented.

Answer: Fill your code here. You also have to submit your code to i-campus.

NOTE: You should write your codes in 'EDIT HERE' signs. It is not recommended to edit other parts. Once you complete your implementation, run the main codes ('main.py') to check if it is done correctly.

(2) [20 pts] Writre your experimental results.

(a) For 'Iris' and 'Digit' dataset, adjust the number of training epochs and learning rate to maximize accuracy. Report your best results for each optimizer.
(Batch size = 10 for Iris & 256 for Digit, epsilon = 0.01, gamma = 0.9)

Answer: Fill the blank in the table.

Dataset	Optimizer	# of epochs	Learning rate	Acc.
Iris	SGD			
	Momentum			
	RMSprop			
Digit	SGD			
	Momentum			
	RMSprop			

(b) For ‘Digit’ dataset, execute the softmax classifier with a given parameter setting. Using the code provided in ‘main.py’, show 10 sample images for true labels and corresponding predicted labels. (Set the variable ‘show_plot’ as ‘True’ to show sample images.).

Parameter Settings	
Batch size	256
Learning rate	0.00001
Optimizer	RMSProp
Epsilon	0.01
Gamma	0.9
# of Epochs	50

Answer: Show the result image.