進階機器學習 Advanced Machine Learning

Homework #4
Due 2024 April 17 11:00PM

(一) Develop a RNN model to classify the images given in ***HW2_MNIST_test.zip***. Use the data and label given in ***HW2_MNIST_train.zip*** to train your model. Your model only needs to decide which digit the images belongs to. The images should be converted into a sequence by dividing the image into several basic blocks. In this homework, you should provide:

1. Compare different types of RNN layers such as SimpleRNN, LSTM and GRU and compare their training results.
2. The prediction result of the enclosed ***HW2_MNIST_test.zip***. You have to submit the entire program and a CSV file ***HW4_prob1.csv*** with the following format.

	A	B	C
1	image	class	
2	0000000.png	0	
3	0109539.png	8	

(二) For the 50 pairs of (x,y) data provided in the attached *HW4_prob2.csv* file, use pytorch to implement a model in order to generate another 50 data similar to the distribution of the given data. Show the given and generated data on the figure marked using different colors.

(三) Describe what you plan to do for your final project. Remember include the paper or refer to the reference site you want to study. You should notice

1. To avoid more than one team present the same topic, some of your proposals may be asked to be modified later.
2. You should try to express clearly and intuitively about the technical details about your selected topic. You should also try to demo the related implementation results.
3. You are encouraged to study the following related topics:
   - i. LLM related issue
   - ii. Transformed based model for different tasks
   - iii. Semi-supervised learning
   - iv. Openset detection
   - v. Out of data detection
   - vi. Any Top3 papers for any tasks
   - vii. Multimodal learning related issues
   - viii. Fine tuning of LLM model

ix. PPO reinforcement learning
x. Novel optimization algorithm
xi. Any related issues with the permission of the teacher.