進階機器學習 Advanced Machine Learning

Homework #3
Due 2025 April 9 11:00PM

(一) Develop an RNN model to classify the images provided in ***HW2_MNIST_test.zip***. Use the data and labels from ***HW2_MNIST_train.zip*** to train your model. Your model should only predict which digit each image represents. The images should be converted into a sequence by dividing each image into several basic blocks. For this homework, you should provide:

1. A comparison of different types of RNN layers such as SimpleRNN, LSTM and GRU and evaluate their training results.
2. The prediction result for the images in ***HW2_MNIST_test.zip***. You need to submit the complete program along with a CSV file named ***HW3_prob1.csv*** according to the following specified format.

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

(二) For the given text in ***HW3_ text.csv***

1. Decide the size of your vocabulary which should also consider those special characters and emojis such as 😒, 🤔, etc.
2. Show top 10 most used words.
3. Generate a word cloud for these texts, similar to the graph shown below.

4. Develop two models to classify these texts into one of the three possible sentiments. One of the models should be an RNN. Display the confusion matrix for training result of the model. (There is no need to split the provided dataset into training and testing datasets.)

5. Develop an RNN model that can predict the remaining words of a sentence based on the initial words you input. The predicted sentence should closely resemble one of the provided texts.

(三) Describe your plans for the final project. Be sure to include the paper or reference site you intend to study. Keep in mind the following:

1. To avoid multiple teams selecting the same topic, your proposal may be requested to change at a later stage.
2. In the final presentation, you should clearly and intuitively explain the technical details of your chosen topic. Additionally, aim to demonstrate the relevant implementation results.
3. The topic of your final project should fall within, but is not limited to, the following areas:
   i. Transformer
   ii. Multi-modal LLM
   iii. Physical AI
   iv. Graph Network Simulator