

Second Programming Exam.

Deep Learning, 2022

1. Given a data set contained in the file named “class_trn.csv”, please design a feed forward neural network to train the classifier. Note that the class of every training data is put at the last column of the file. Please design your neural networks using unsupervised pretraining techniques. Test your trained classifier with unsupervised learning on the data contained in the file named “class_tst.csv”. Put your classification results along with testing data into the file named “class_answer.csv”. Describe the details and structures of autoencoders you are going to use in every step. Put all the details into the file named “report1.pdf”. Please also draw a figure showing convergence of learning errors and put this error convergence figure into the file “report1.pdf” along with your design details. **Note that the figure of learning error convergence means the figure with learning errors on the y-axis and learning epochs on the x-axis.** Please also draw the error convergence without unsupervised pretraining so that you can compare the effect of your unsupervised pretraining. Please submit the following files: (1) the report file “report1.pdf”, (2) the file “class_answer.csv” containing the original testing data and your answers to the testing data, (3) the file “class.h5” containing your neural network model, (4) the file “class_source.pdf” containing your source code. (40%)
2. Given a time series as shown in the file named “predict1_trn.csv”, please design an LSTM recurrent neural networks to predict the time series signals at the next $t+1$, $t+2$, ..., $t+6$, time steps given that the neural network takes the time series signals at t , $t-1$, $t-2$, ..., $t-23$, time steps as the inputs. Verify your result by using the testing data contained in the file named “predict1_tst.csv”. Please put your design details including the neural networks structure into the file named “report2.pdf”. Draw the learning error convergence and put the figure into the file “report2.pdf”. Please submit the following files: (1) the report file “report2.pdf”, (2) the file “predict1_answer.csv” containing the original testing data and your answers to the testing data, (3) the file “predict1.h5” containing your neural networks model, (4) the file “predict1_source.pdf” containing your source code. (30%)
3. Given a time series as shown in the file named “predict2_trn.csv”, please design a GRU recurrent neural networks to predict the time series signals at the next $t+1$, $t+2$, ..., $t+4$, time steps given that the neural network takes the time series signals at t , $t-1$, $t-2$, ..., $t-11$, time steps as the inputs. Verify your result by using the testing data contained in the file named “predict2_tst.csv”. Please put your design details

including the neural networks structure into the file named “report3.pdf”. Draw the learning error convergence and put the figure into the file “report3.pdf”. Please submit the following files: (1) the report file “report3.pdf”, (2) the file “predict2_answer.csv” containing the original testing data and your answers to the testing data, (3) the file “predict2.h5” containing your neural networks model, (4) the file “predict2_source.pdf” containing your source code. (30%)

Please follow the requirements in every problem and submit totally 12 files. Do not compress your submitted files. **Email me to the address ltyao@ntut.edu.tw by 15:00, May 29, 2022. No late submission is accepted**