

Assignment 03

Handed out: 09/19/2025

Due by 11:59 AM EST (noon) on Saturday, 09/27/2025

Problem 1. Consider Jupyter notebook `Classifying-movie-reviews.ipynb` we discussed in class. Run provided notebook, if anything needs fixing, please fix. Stick to RMSPROP optimizer.

(10%)

Problem 2. Above model is overfitting early. Please add L2 and L1 regularizations to the first and the second dense hidden layer. Run the model initially with just $L1=0.001$, next with just $L2=0.001$ then following pairs of L1, L2 parameters together: (0.01,0.01), (0.005,0.005). Apply the same regularization parameters to both Dense (16) layers in all cases. In all, you will perform 4 experiments. Compare accuracy and loss function plots with those you generated in Problem 1. Report whether applied regularizations affected the overfitting and if yes in what way.

(20%)

Problem 3. Let us do some more tests with `Classifying-movie-reviews.ipynb` notebook. This time, to fight overfitting, instead of regularization add a Dropout layer after the first and the second hidden Dense layer. (You do not apply dropout, usually, to the Input layer and to the output layer.) Run tests with Dropout layers which pass 20% of signal from the preceding Dense layers and in the second experiment with the Dropout layers that pass 10% of the signal. Compare accuracy and loss function plots with those you generated in Problem 1 and 2. Also, make comparison with the results for the Dropout layers with 50% reported in the notes. Report whether applied Dropout layers affected the overfitting. If yes, in what way.

(20%)

Problem 4. Consider Jupyter notebook `Predicting-house-prices.ipynb` we discussed in class. Run the notebook with K-fold validation with $K=3$. Capture results and compare with results presented in the lecture notes.

(10%)

Problem 5. To the model in Problem 4, please add Dropout layers with probability 0.5 after the first and the second Dense hidden layer. Compare your training curves with those in Problem 4. Report on effects of those dropout layers, if any.

(20%)

Problem 6. Attached notebook `Classifying-newswires.ipynb` demonstrates multi-class classification. Run the code as provided. Then, experiment with reducing the number of hidden layers to 1 and then increasing the number of hidden layers to 3. You

are free to choose the number of neurons any your model. Compare training results with those of the original model and report.

(20%)

Please, place your full name in the form “Last name, first name” on all submitted artifacts. CSCIE89_YourLastName_FirstName_solution< >.html ,
CSCIE89_YourLastName_FirstName_solution< >.ipynb

When submitting Jupyter ipynb files, please submit an HTML image of that file as well. Your main submission should be made of one or several Jupyter notebook(s) and (its) HTML image(s). Your notebook(s) should include all results, images and comments.

Please include full statement of every problem in a markdown field before you start implementing that problem. If your notebook(s) contain(s) excessively long outputs, please copy a meaningful and illustrative number of initial and/or final lines and paste those in a markdown (comment) cell. Then, delete the long output(s).

It is not acceptable that you describe your solution of any of these problems on Ed.