Assignment: Building, training and testing feed forward neural networks

In this assignment, you will build simple feed forward neural networks to classify a dataset with 14 real-valued/categorical attributes and each data point belongs to 1 of 2 classes. The data is about credit card approval, where you will use 14 pseudonymised attributes related to each credit card applicant to predict whether or not their card will be approved. Please refer https://archive.ics.uci.edu/ml/datasets/Credit+Approval for more details on the dataset.

Q1) Do a literature review on how to select the number of hidden layers and the number of neurons in each layer for a given problem. List your findings in bullet form with the relevant citations.

Q2) Construct feed forward neural networks with one or more hidden layers for the above prediction problem and report their average F1 measure over 5-fold cross validation of the dataset. You can use any tool/language you prefer though Keras is recommended. You will need to try out neural networks with different sizes, different activation functions and different training loss functions (try squared error and cross entropy with logistic loss) before you arrive at the best results you can get. Report the average F1 for each neural network you tryout and highlight the best result. You can use any guidelines you may find from your literature review in Q1.

Q3) Explain whether your results agree or not with what you found in your literature review in Q1.

Q4) Take the best network you found in Q2 above and retrain it with the addition of regularization to the loss function. Try L1 and L2 regularization. For each training set in your 5-fold cross validation, use part of it as a validation set to try out different values of λ to find the best trade off between the loss function and the regularizing term. Report the final average F1 score on the test sets of the 5-fold cross validation and comment on whether regularization helped or not.