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 Quiz 9.9.4
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Test your knowledge of LO 9.9.4

1. Does the following statement correctly describe **the two major issues affecting the performance of a NN: overfitting and slow processing**?

Statement:

- **Overfitting** refers to the situation in which the output function fits closely with observable data X and Y , but it has little to do with the true relationship between X and Y (i.e. trained model captured more data “noise” and less data “signal”).
- **Slow processing** of the NN final output is due to the hundreds of thousands of times a machine learning program must run to generate a reliable nonlinear prediction.

- Not correct
- Correct

2. Does the following statement correctly describe **the role of regularization penalty in training a NN**?

Statement:

The main objective of the regularization penalty is to reduce the number of input features/independent variables, which in turn will avoid overfitting and poor out-of-sample performance.

- Not correct
- Correct

3. Which of these is NOT one of the **three objectives of NN validation** mentioned in the reading?

- I) The level of regularization, λ , to achieve the optimal prediction in a variance versus bias trade-off.
- II) The depth of the neural network (number of hidden layers), L .
- III) To measure the speed factor π .
- IV) The proper number of the hidden layers (number of neurons – data features or fields to keep at each layer).

- I
- II
- III
- IV

4. Does the following statement correctly describe **the dropout method for selecting features**?

Statement:

In the dropout method, a given layer processes only a set of randomly selected p fractions of inputs, and drops the remaining fraction $(1 - p)$ of inputs into a given layer. The method then carries out the NN to check whether the loss function has increased or decreased. The random dropout is repeated with another set of randomly selected p fractions of inputs. The process is repeated until the minimum loss input selection is achieved. The fraction p is known as dropout threshold, set by the NN designer.

- Not correct
- Correct

5. Which of these is NOT one of the **two methods for accomplishing regularization** mentioned in the reading?

- I) The loss function is artificially decreased by the regularization parameter λ , which in turn expedites the convergence and reduces the complexity of the NN model.
- II) Avoid reducing the number of input features in each node.
- III) Using the dropout method to reduce the number of input parameters, which in turn simplifies the complexity of the NN model.

- I
- II
- III

6. Does the following statement correctly explain **why overfitting may not always explain the poor performance of a NN during validation**?

Statement:

Overfitting may not be the culprit of the underperforming NN when the underlying data distribution is non-stationary, that is, the data distribution changes over time. As a result, after calibrating the NN model with a non-stationary data distribution, the NN always produces an unsatisfactory over-fitted prediction if used with a new dataset that has a different data distribution than the one used for calibration.

- Not correct
- Correct

7. Does the following statement correctly describe **the directional prediction** ?

Statement:

The directional prediction puts emphasis on the accuracy of the forecast direction:

$$e_{\text{directional},t} = R_t * \text{sign}(E[R_t | R_{t-1} \dots R_{t-1-k}])$$

– If the realized out-of-sample return and the NN’s forecast return are both positive or negative, the **error is the absolute value of the realized return**.

– If the realized out-of-sample return and the NN’s forecast return have opposite signs (“+” vs. “-”, or “-” vs. “+”), the **error is the negative value of the realized return**.

- Not correct
- Correct

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