DS-670 Assignment 11: Discussion and Conclusion Mohamed Mohamar

For my competitor:

In this article, the authors are proposing a method that uses a single-hidden layer feedforward neural network for forecasting intermittent demand. Which is based on the back-propagation gradient-descent, perceptron algorithm described earlier in the introduction to Neural Networks. However, due to some of the drawbacks of back-propagation gradient descent algorithms including, slow convergence, setting learning parameters, etc. They are relying on a “faster learning algorithm”, first introduced by *Huang et al. (2006),* and later reviewed by the same authors *Huang et al. (2015).* Their proposal aims to “helping the network to learn the temporal behavior of the time series in terms of zero/non-zero demand” *(Lollia et al. 2017).* They compared the accuracy of their forecasting model with other Neural Networks that dealt with intermittent demands *(Guttierez et al., 2008; Mukhopadhyay et al. 2012; Croston, 1972; Syntetos and Boylan, 2005).*

As conclusion, the authors argue that “this comparison was then enriched by adopting two different accuracy metrics on different time horizons. Such a detailed comparison aims at bridging the gap between theory and practice of ANNs in the field of intermittent demand.” *(Lollia et al. 2017)*. “In fact, the potential for implementation of ANNs in real environments can only increase by providing useful guidelines about their design and training for practitioners. Finally, a statistical analysis of the networks’ performance was conducted, for robust validation of the results.” *(Lollia et al. 2017)*

For my results. (Conclusion to come later)

1. For each of the dates not included in the model, meaning the fourth quarter of each the years 2011 to 2015, I will predict the return for each stock with the neuralnet model, and use that to rank my stocks in a decreasing order before splitting them into 5 groups. I will then calculate the average returns for each group, and discuss the difference in returns for each group.
2. For the fourth quarter of 2011.

|  |  |  |
| --- | --- | --- |
| Groups | Average returns for 2011-12-31 | Predicted returns for 2011-12-31 |
| Group 1 | 0.11920804902 | 0.10329895143 |
| Group 2 | 0.11864927415 | 0.08354768423 |
| Group 3 | 0.10646070662 | 0.07487498111 |
| Group 4 | 0.05638041033 | 0.05834756905 |
| Group 5 | -0.02173637167 | -0.00277221546 |

**Table 1.1: Compared returns for 2011-12-31**

For the fourth quarter of 2011, a comparison between the average logreturns and the predicted returns using neuralnet shows that they are higher and pretty close for group 1 where the average return is 0.094 and the predicted return is 0.11. For group 2, predictions are little lower, with an average return of 0.12 and a predicted return of 0.082. Same trend for group 3 with an average return of 0.12 and a predicted return of 0.073. Predictions are close and a little lower for group 4 with an average return of 0.073 and a predicted return of 0.059. Predictions for group 5 are higher with an average return of -0.025 and a predicted return of -0.0066. Returns for group 5 remain in negative territory for this quarter.

1. For the fourth quarter of 2012.

|  |  |  |
| --- | --- | --- |
| Groups | Average returns for 2012-12-31 | Predicted returns for 2012-12-31 |
| Group 1 | 0.114665701169 | 0.11928866714 |
| Group 2 | 0.115336406124 | 0.10229519698 |
| Group 3 | 0.127731203722 | 0.09334380542 |
| Group 4 | 0.093139804160 | 0.08427562973 |
| Group 5 | -0.008158161041 | 0.03373893868 |

**Table 1.2: Compared returns for 2012-12-31**

For the fourth quarter of 2012, a comparison between the average logreturns and the predicted returns using neuralnet shows that overall they are pretty close for all the groups. Predictions are lower for group 1 with an average return of 0.13 and a predicted return of 0.12. For group 2, predictions are little lower, with an average return of 0.11 and a predicted return of 0.10. Same trend for group 3 with an average return of 0.10 and a predicted return of 0.09. Predictions are lower but very close for group 4 with an average return of 0.10 and a predicted return of 0.08. Similar trend for group 5, lower but close, with an average return of -0.0025 and a predicted return of -0.14.

1. For the fourth quarter of 2013.

|  |  |  |
| --- | --- | --- |
| Groups | Average returns for 2013-12-31 | Predicted returns for 2013-12-31 |
| Group 1 | 0.12644519447 | 0.15312263061 |
| Group 2 | 0.06797968658 | 0.09074951366 |
| Group 3 | 0.05911131016 | 0.08574644381 |
| Group 4 | 0.05774970242 | 0.07914463761 |
| Group 5 | 0.04230322318 | 0.03131959371 |

**Table 1.3: Compared returns for 2013-12-31**

The fourth quarter of 2013 has similar trends from the fourth quarter of 2012. A comparison between the average logreturns and the predicted returns using neuralnet shows that overall they are pretty close for all the groups. Predictions are lower for group 1 with an average return of 0.117 and a predicted return of 0.114. For group 2, predictions are little higher and very close, with an average return of 0.08 and a predicted return of 0.09. Same trend for group 3,

Predictions are higher and very close, with an average return of 0.05 and a predicted return of 0.09. Predictions are higher and very close for group 4 with an average return of 0.07 and a predicted return of 0.08. Predictions are lower for group 5, but remain very close, with an average return of 0.03 and a predicted returns of 0.02.

1. For the fourth quarter of 2014.

|  |  |  |
| --- | --- | --- |
| Groups | Average returns for 2014-12-31 | Predicted returns for 2014-12-31 |
| Group 1 | 0.108462193102 | 0.054992042596 |
| Group 2 | 0.048025840405 | 0.015478730918 |
| Group 3 | 0.029199241871 | 0.003751441872 |
| Group 4 | -0.009906632518 | -0.009045513456 |
| Group 5 | -0.159289343516 | -0.161057832384 |

**Table 1.4: Compared returns for 2014-12-31**

For the fourth quarter of 2014, a comparison between the average logreturns and the predicted returns using neuralnet shows that overall they are pretty close for all the groups. Predictions are little lower for group 1 with an average return of 0.10 and a predicted return of 0.06. For group 2, predictions are also lower, with an average return of 0.08 and a predicted return of 0.02. Same trend for group 3 with an average return of 0.034 and a predicted return of 0.006. Predictions are higher and very close for group 4 with an average return of -0.027 and a predicted return of -0.016. Similar trend for group 5, higher and very close, with an average return of -0.17 and a predicted return of -0.13. Predictions for groups 4 and 5 remain in negative territory.

1. For the fourth quarter of 2015.

|  |  |  |
| --- | --- | --- |
| Groups | Average returns for 2015-12-31 | Predicted returns for 2015-12-31 |
| Group 1 | -0.11170813107 | -0.1566479089 |
| Group 2 | -0.09434602171 | -0.1827566447 |
| Group 3 | -0.12641122779 | -0.1982944464 |
| Group 4 | -0.16427263970 | -0.2162889483 |
| Group 5 | -0.33510869252 | -0.2934782144 |

**Table 1.5: Compared returns for 2015-12-31**

For the fourth quarter of 2015, a comparison between the average logreturns and the predicted returns using neuralnet shows that overall they are lower and pretty close for all the groups. Predictions are little lower for group 1 with an average return of -0.10 and a predicted return of -0.18. For group 2, predictions are also little lower, with an average return of -0.08 and a predicted return of -0.19. Same trend for group 3 with an average return of -0.13 and a predicted return of -0.19. Predictions are lower and very close for group 4 with an average return of -0.19 and a predicted return of -0.2. Predictions are higher for group 5, and remains very close, with an average return of -0.33 and a predicted return of -0.31.

1. For each of the dates not included in the model, for the consumer services sector, I will predict the return for each stock in the neuralnet model, and use that to rank my stocks in a decreasing order before splitting them into 5 groups. I will then calculate the average returns for each group, and discuss the difference in returns for each group. My dates that are omitted from the model are the fourth quarter of each year, from 2011 to 2015.
2. For the fourth quarter of 2011.

|  |  |  |
| --- | --- | --- |
| Groups | Average returns for the consumer services sector for 2011-12-31 | Predicted returns for the consumer services sector for 2011-12-31 |
| Group 1 | 0.07440042386 | 0.19869675685 |
| Group 2 | 0.10258814887 | 0.10096677348 |
| Group 3 | 0.11422949794 | 0.07340414277 |
| Group 4 | 0.14370097771 | 0.03797191082 |
| Group 5 | 0.11073043774 | -0.08251064998 |

**Table 2.1: Compared returns for the consumer services sector for 2011-12-31**

For the fourth quarter of 2011, a comparison between the average logreturns and the predicted returns using neuralnet shows that overall they are pretty close for all the groups. Predictions are higher for group 1 with an average return of 0.13 and a predicted return of 0.16. For group 2, predictions are little higher, with an average return of 0.097 and a predicted return of 0.10. Predictions are lower for group 3 with an average return of 0.11 and a predicted return of 0.07. Predictions are lower and close for group 4 with an average return of 0.12 and a predicted return of 0.04. Similar trend for group 5, lower and close, with an average return of 0.097 and a predicted return of -0.047. Predictions for group 5 reached negative territory for this quarter.

This is what I get so far. More analysis to come for the other dates.

Note: You might find that the number in the Tables are a little different from the ones in my analysis. That is because the neuralnet renders different number every time it's run. Which will be fixed in the final paper.