**CSIC:5011 Project:1 Rebuttal**

By: Neel Kanth Kundu and Avik Kumar Das

1. **Cao Yang:** We thank the reviewer for the constructive comments.
2. For a fair comparison of PCA-FNN with Vanilla FNN we have kept the depth and number of neurons same for both. In this setting, PCA-FNN is performing slightly better (~0.2%). Vanilla FNN can give improved performance if the network complexity is increased by adding more number of neurons and layers. Here, the main benefit is reduction in inference time.
3. Although the main aim of the project was to show the effectivity of horn’s parallel analysis to determine the optimum number of reduced dimensions to improve the performance of FNN classification, still we have added 2-D visualization of the MNIST dataset in Appendix.
4. We have mentioned in the report that more advanced methods like CNN can be used in a future work and compared with the current method.
5. **CHEN Zhenghui Group-5:**  We thank the reviewer for the constructive comments.
6. Although the main aim of the project was to show the effectivity of horn’s parallel analysis to determine the optimum number of reduced dimensions to improve the performance of FNN classification, still we have added 2-D visualization of the MNIST dataset in Appendix.
7. We have not compared traditional machine learning algorithms like logistic regression, SVM, k-NN etc. since it is now well known that deep learning based neural networks are the state of the art methods for image classification tasks. We have mentioned in the report that more advanced methods like CNN can be used in a future work and compared with the current method.
8. **Chen Wu:** We thank the reviewer for the constructive comments.

We have not compared traditional machine learning algorithms like logistic regression, SVM, k-NN etc. since it is now well known that deep learning based neural networks are the state of the art methods for image classification tasks. We have mentioned in the report that more advanced methods like CNN can be used in a future work and compared with the current method.

1. **Huang Hanli:** We thank the reviewer for the kind positive comments.
2. **Jose:** We thank the reviewer for the constructive comments.

We have not explored sparse PCA in this project since the dataset considered is not very high dimensional, we are in p<<n regime, where n=60K and p=784 in our case, hence S-PCA is not required.

1. **Men Yixin:** We thank the reviewer for the constructive comments.

We have mentioned in the report that more advanced methods like CNN can be used in a future work and compared with the current method.

1. **Yang Yingxi:** We thank the reviewer for the kind positive comments and for pointing out the minor typo. We have now fixed the poster.
2. **Wong Kyle:** We thank the reviewer for the constructive comments.
3. We have not compared traditional machine learning algorithms like logistic regression, SVM, k-NN, random forest etc. since it is now well known that deep learning based neural networks are the state of the art methods for image classification tasks. We have used deep neural networks since the performance of deep neural networks with more layer is better than shallow networks.
4. The test data is not used during the training of neural network , hence we do not have the problem of overfitting in our project.
5. **Zeng Wenqi:** We thank the reviewer for the constructive comments.
6. We have not compared traditional machine learning algorithms like logistic regression, SVM, k-NN, random forest etc. since it is now well known that deep learning based neural networks are the state of the art methods for image classification tasks.
7. For a fair comparison of PCA-FNN with Vanilla FNN we have kept the depth and number of neurons same for both. In this setting, PCA-FNN is performing slightly better (~0.2%). Vanilla FNN can give improved performance if the network complexity is increased by adding more number of neurons and layers. Here, the main benefit is reduction in inference time.
8. **Zhang Shukang: :** We thank the reviewer for the constructive comments.
9. The main aim of the project was to show the effectivity of horn’s parallel analysis to determine the optimum number of reduced dimensions to improve the performance of FNN classification. We have mentioned in the report that more advanced methods like CNN can be used in a future work and compared with the current method.
10. Although FNN are not the state of the art architecture for image classification task still FNN are universal function approximators [1] and they give better performance than traditional machine learning methods like SVM, logistic regression, random forests etc.

References

[1] K. Hornik, M. Stinchcombe and H. White, "Multilayer feedforward networks are universal approximators." *Neural Networks,* vol. 2, *(5),* pp. 359-366, 1989.