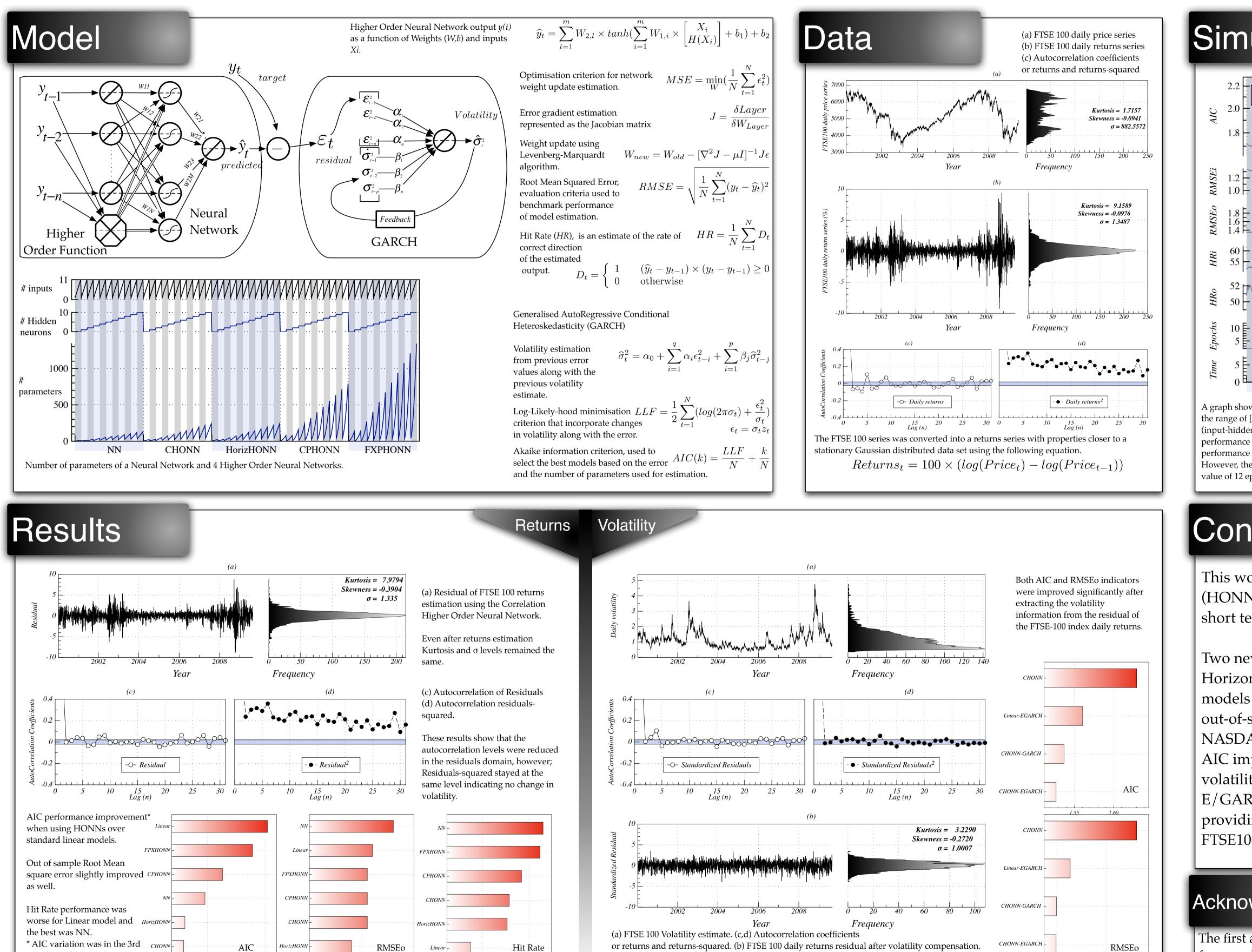
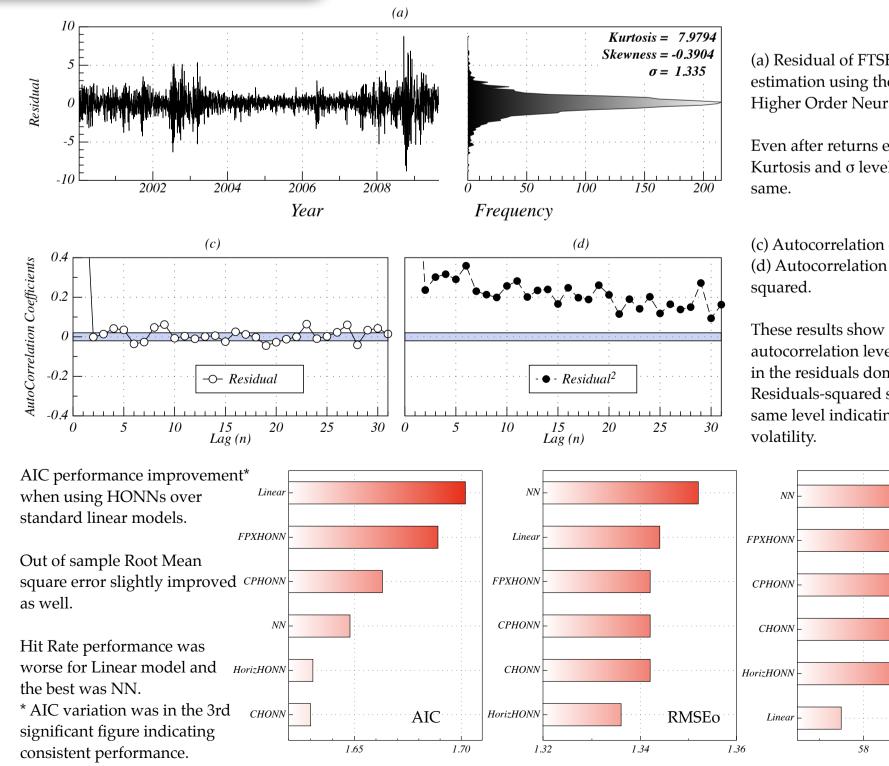
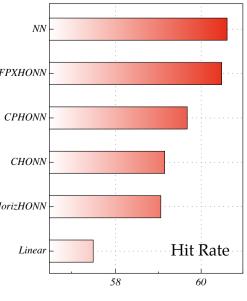
## FTSE 100 Returns and Volatility estimation using Higher Order Neural Networks







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Results show that most of the volatility and returns information was extracted leaving a residual close to a normal-Gaussian distribution.

1.2

1.4

## Simulations

— MSE	MAE	· · · · · · · · · · · · · · · · · · ·		··· ··· ··· ··· ··· ··· ··· ··· ··· ··
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NN	CHONN	HorizHONN	 CPHONN	FXPHONN
ring the simulations of networks with input size range of [1-11] input lags. Hidden neurons in 0-10] in models with a single output neuron. The stripped pattern in this graph matches the 0) parameter count of the graph on the far left. We observe that the in-sample (RMSE, HR) ncreases with the number of parameters in the estimation model. Out-of-sample (RMSE, HR) s better in smaller models. The training time was also correlated to the number of parameters				

performance is better in smaller models. The training time was also correlated to the number of parameters. However, the epochs required for convergence were independent of the number of parameter with a mean value of 12 epochs. Two minimisation criteria were used for training as indicated in the legend.

# Conclusion

This work compared Higher Order Neural Networks (HONN) with Neural Networks, and linear regression for short term forecasting of stock market index daily returns.

Two new HONNs, the Correlation HONN (CHONN) and the Horizontal HONN (HorizHONN) outperform all other models tested in terms of the Akaike Information Criterion, out-of-sample root mean square error, of FTSE100 and NASDAQ giving out-of-sample Hit Rates of up to 60% with AIC improvement up to 6.2%. New hybrid models for volatility estimation are formed by combining CHONN with E/GARCH are compared with conventional EGARCH, providing up to 2.1% and 2.7% AIC improvement for FTSE100 and NASDAQ.

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