There is often confusion between what falls within the realm of statistics and what is under the machine learning umbrella. Further, which one is better for solving a problem utilizing data? Through this analysis,

The two modeling approaches described above are theoretically quite different and while some similar conclusions can be made from both approaches, there are also some major differences. The proportional odds model is a semi-parametric model while neural networks are parametric. A proportional odds model is intended specifically for handling ordinal outcomes where neural networks typically handle classification. However, utilizing CORAL in this instance highlights the true flexibility of applications of neural networks. With a large enough sample size, validating neural networks is most commonly done through a test set as done in this analysis, but with a regression model such as proportional odds model it is more common to use bootstrap validation or cross-validation. A very important difference between these modeling approaches is how predictors are input into the model. A neural network inputs all features the same way in raw form and can handle any nonlinear associations or interactions extremely well. As it is a black box, this is not something that can be understood, but there is no concern for making inaccurate assumptions about predictors and their relationships with the outcome variable. This is a large concern with a proportional odds model as for each predictor it must be manually decided upon how that predictor should added to the model. All nonlinearity, interactions or transformations must be specified even though the true relationship with the outcome is unknown.

The largest limitation to the proportional odds model is its reliance on assumptions, most importantly the proportional odds assumption. While neural networks, do not rely on underlying assumptions, this analysis has shown how difficult it is to understand feature importance from a neural network. This is something that is quite easy to comprehend with a proportional odds model. As far as model predictions, Figure 8 shows the probability of being home/IPR for 90 days post-liver transplant averaging over all patients. The first 10 and the last 30 days are extremely similar for both models, but the proportional odds model has lower probabilities from about day 10 to day 60.