ABSTRACT

THESIS: Weibull Neural Network Survival Models with Frailty Effects

STUDENT: Sam Kinghorn

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Determining the exact relationship between features, including interaction and non-linear effects, and event times in traditional semi-parameteric and parametric survival analysis models can be difficult. Machine learning techniques, such as neural networks, allow for a more flexible model fit with fewer distributional assumptions while accommodating censored data. A major advantage of flexible, machine learning techniques is that they don't assume the functional form of the systematic component. The goal of this thesis is to apply neural networks to survival data to better account for the relationship between features and the response. The results will be useful in prediction of survival outcomes but we cannot make immediate inferences about the relationships between covariates and the response for neural networks. These methods will be extended to account for frailty effects. This is done through neural network generalization of the parametric Weibull model using the approach of previous neural network generalizations of the Cox proportional hazards (PH) model.