Survival Analysis Software for Medical Applications

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Survival Data Analyzed as a Binary Classification Problem

Calculating survival data, common in medical applications, faces challenges in applying predictive data-analytic methods because survival times for censored observations are unknown. A new approach analyzes survival data as a binary classification problem and uses software based on SVM+/LUPI (support vector machine, learning using privileged information) to solve the problem. The SVM+ approach uses information about survival time to estimate an SVM classifier and then predicts a subject's status at a point of time of interest (instead of the time elapsed from an initiating event to an end point of interest).

Better Predictive Performance than Classical Statistical Modeling

Survival analysis focuses on the time elapsed from an initiating event to an event, or endpoint, of interest. Methods for survival analysis developed in classical statistics model such data by describing the occurrence of events by means of survival curves and hazard rates, and analyze their dependence on covariates by means of regression. Classical statistics further makes specific assumptions about the parametric form of a distribution, using training data to estimate its parameters, but this probabilistic approach may produce a poor predictive model if the parametric model is specified incorrectly or if the number of training samples is too small. While machine learning methods focus on estimating (learning) a good predictive model from available data, it is has not yet been widely used. This new model assumes a predictive setting and develops a data-analytic methodology using privileged information for predictive modeling of survival data. Instead of predicting survival time, this new approach predicts a subject's status at a time point of interest. For data sets with a large amount of censored data, or when the observed survival time does not follow classical probabilistic assumptions, this method yields better predictive performance than classical statistical modeling.

BENEFITS AND FEATURES:

- Analyzes survival data as a binary classification problem
- Software based on SVM+/LUPI
- Predicts a subject's status at a point of time of interest (instead of time elapsed from an initiating event to an end point)
- For data sets with a large amount of censored data
- When observed survival time does not follow classical probabilistic assumptions

APPLICATIONS:

- Survival analysis prediction/modeling
- Medical applications
- Death rate of transplant patients (clinical trial)
- Time to life insurance claim
- Customer churn rate or attrition rate in business (e.g., subscriber -based business, cell phone company, bankruptcy)
- Mechanical breakdown
- Marriage failure predictions

Phase of Development - Beta Software Available

Researchers

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Publications

Learning using privileged information (LUPI) for modeling survival data
2014 International Joint Conference on Neural Networks, July 2014

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