BASIC APP INFORMATION

The TDCS Vis App is an R Shiny App that can perform survival analysis using an appropriate user-uploaded file.

The main objective of the app is to provide an intuitive interface for interpreting survival analysis results with time-varying covariates. Extensions of the Cox proportional hazard to study the association between a variable that can change after baseline and a time-to-event outcome of interest exist, but the interpretations can be challenging. A new approach described by Jay & Betensky overcomes this problem by predicting the survival function for a user-specified trajectory of one time-varying covariate. The TDCS Vis app uses this method to predict survival curves for interpretable results of biomedical research.

To use the app, the user can upload the data file in the DATA tab, and the app provides survival prediction curves that can be viewed or downloaded in the PLOT tab. The survival prediction curve in the PLOT tab is a 2D plot that gives the probability of survival (X axis) over a given length of time (Y axis) considering time in several small intervals. It is accompanied by a ‘number at risk table’ that gives information about the overall number of subjects at risk at fixed time points. The app also allows for comparison of multiple different transition times in the COMPARISON PLOT tab.

EXAMPLE DATASET

Primary sclerosing cholangitis is an autoimmune disease that eventually leads to cirrhosis and liver decompensation. Here, we have used the PBC data from a 10-year Mayo Clinic trial that studies the difference in prognosis for patients with PBC who had normal versus elevated bilirubin levels.

Serum bilirubin is a time varying co-variate that has been identified as a strong prognostic indicator for PBC, with repeated high levels associated with disease progression. It is of clinical interest to visualize the survival function not just for patients who have consistently high bilirubin levels but also for patients whose bilirubin levels increase or decrease during the course of treatment.

We display our proposed survival estimates for patients defined by the covariate path wherein a patient has onset of high bilirubin at year five and remains high thereafter. As expected, the survival estimates associated with this trajectory are intermediate to the always normal and always high bilirubin estimates. This also provides important insight into the sensitivity of survival to the transition time of the bilirubin changes, a faster transition time leading to low survival or faster disease progression and a slower transition time leading to better survival or slower disease progression.

Other examples:

* The time to event analysis of the occurrence of serious infections in a placebo-controlled trial of gamma interferon in chronic granulotomous disease (CGD). (tmerged dataset)
* The time to event analysis of hdl levels in a population study of non-alcoholic fatty liver disease (NAFLD). (non tmerged data)