**MANUSCRIPT**

**NOVEL VISUALISATION OF TIME-TO-EVENT HEALTH DATA**

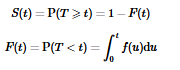
*Author: Victor Pacifique Rwandarwacu, Ranganath Shyamsundar*

**ABSTRACT**

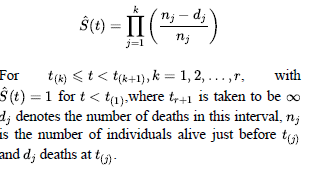
1. **INTRODUCTION**

Time-to-event or survival Analysis is the analysis of data in the form of times from a well-defined time origin until the occurrence of some particular event or endpoint (1). Survival data are generally asymmetric and censored, which requires the use of specific approaches for analysis and visualizations, such as this survival function, Kaplan Meier Plot estimator and plot .

The survival function S(t) is the probability that the survival time is greater than or equal to time(t) which is the observed value of random variable with distribution functionF(t) (2).



The Kaplan Meier estimate of the survival function at kth interval is given by:



Rationale

Survival Ratio, a robust approach for comparing survival distributions (3)

1. **GOAL**

To explore the use of novel informative visualizations of time-to-event data, specifically comparing survival curves of different covariates or treatments in a trial.

1. **EXAMPLE DATASETS**
2. **TCGA Breast cancer carcinoma (BRCA)**

The dataset is from the NIH National Cancer Institute, TCGA Program on a project called “Breast invasive carcinoma (BRCA)”. It contains information about: demography, exposure, Family History (regarding cancer), Follow up, Molecular Test, other Clinical Attribute, pathology detail, and Treatment of female Breast cancer patients diagnosed and followed up for different outcomes.

1. **Standard data set (without covariates )**
2. **Time to event data set (with paired data )**
3. **METHODS**
4. generate Novel survival plots

* survival ratio plot for independent groups with confidence intervals
* survival difference plot for independent groups with confidence intervals
* Survival ratio plots for paired data using permutation envelopes.
* Comparison survival distributions across more than two groups utilizing non-parametric statistical methods to identify significant differences.

1. Survey on preferences between novel survival plots versus standard visualization od time to event data.

Online survey will be generated to targeting clinicians, statisticians and general population, to understand their preferences between novel visualisation versus standard plots such as Kaplan Meier.

1. Qualitative analysis of feedbacks (Themes)
2. **RESULTS**
3. **DISCUSSION**
4. **ACKNOWLEDGMENTS**
5. **REFERENCES**

1. Collett D. Modelling Survival Data in Medical Research [Internet]. Taylor & Francis; 2023. (Chapman & Hall/CRC texts in statistical science). Available from: https://books.google.ie/books?id=rIp0zwEACAAJ

2. Peace KE. Design and Analysis of Clinical Trials with Time-to-Event Endpoints [Internet]. CRC Press; 2009. (Chapman & Hall/CRC Biostatistics Series). Available from: https://books.google.ie/books?id=3f\_LBQAAQBAJ

3. Newell J, Kay JW, Aitchison TC. Survival ratio plots with permutation envelopes in survival data problems. Comput Biol Med. 2006 May 1;36(5):526–41.