

Reliability Analysis Assignment 1

Chia-Hsuan Chang and Kuan-I Chung

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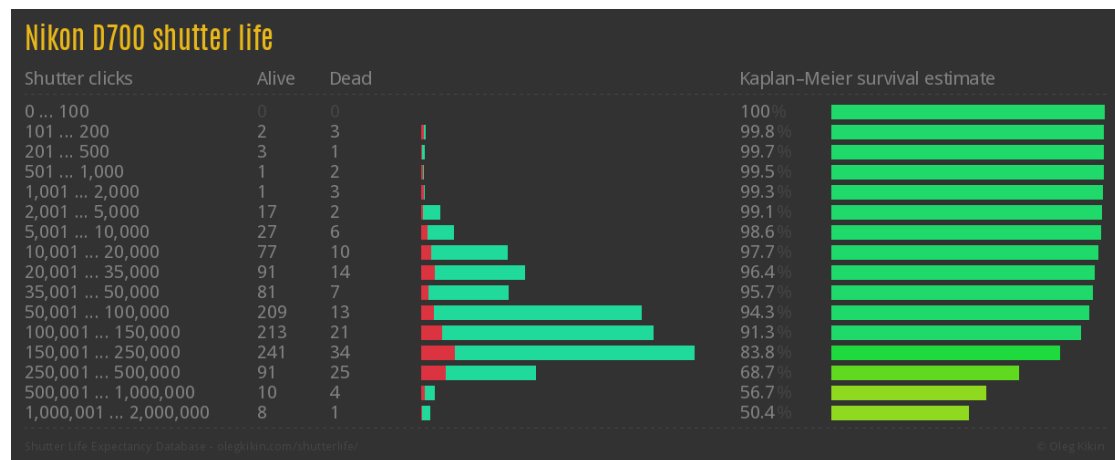
Reading Report — Reliability in the 21st century (S. Wilson, 2009)

The reliability analysis can be used widely in many fields including biology, technology and even finance. In biology, this method is applied on survival analysis for estimating hazard ratios and other relevant statistical inferences. It helps insurance companies building up a standard criteria for approving a life insurance and pricing fees. In technology, Reliability is not only used for predicting the life of a chip but also newly utilized in the IT industry for network (including software, hardware and human) degrading detection. In finance, of course, banks and other financial institutions heavily use the reliability for calculating the potential risks caused by financial products.

The reliability is originally applied in the traditional industries for estimating the life of products under the different conditions. For some computational difficulties, the independence assumption is claimed. That is, the predictors are independent and the models contain no interactions. Yet, practically, the most of the predictors are not independent. For example, in hydrology, considering how storms cause floods, the storms occur under appropriate temperature and humidity such that this three predictors do not meet the assumption of independence.

Besides the contents in the article, we found an example on the internet. Nikon, a world-famous optical product manufacture, launched D700, a full-frame DSLR, in 2008. They claimed that the shutter set tolerates over 150 thousand shots. Thus, Oleg Kikin (<https://www.olegkikin.com>), a photographer and a blogger built up a website for D700 users such that they could log in two informations, shutter clicks and being

dead or not. And the following figure shows the result of Kaplan-Meier survival estimate.



from: https://olegkikin.com/shutterlife/nikon_d700.htm

We can notice that the K-M method estimates only 91.3% of shutters sets still function over 150 thousand clicks no matter what the user habits are. Yet, the original factory tested their products by continuous shooting in a severe environment. Thus, this sample survey did not really match what the Nikon claimed. However, the website only considered two variables, the users' habits and the machines' operating environments are excluded. Furthermore, the collected data from the visitors of the website might be inappropriate for repeated logging in or maliciously forged logging in which strongly affect the result of the analysis. Hence, the research done by Oleg Kikin might be naive.

Here we want to introduce a concept which could be applied with reliability analysis — the music industry. As the internet spreads world-widely, the steaming music services gradually replace the traditional records. Spotify, Apple Music and KK Box record the clicking frequencies of songs. Usually, the clicking frequencies decrease after publishing. Thus, we can analyze the "life time" of songs, discovering the relationship between the clicking rates and the other relevant variables, and then increase the out put value of the entertainment industry.