



Project title	F-G Distributions for Survival and Reliability Modelling
Principal supervisor	Professor MC Jones
Second supervisor	Dr CM Queen
Discipline	Statistics
Research area/keywords	Distribution theory; survival analysis; reliability analysis
Suitable for	Full time students

Project background and description

One of the most popular methods of creating families of univariate continuous distributions on the whole real line R with parameters controlling skewness and tail weight has some of its antecedents in survival and reliability modelling (where univariate data live on the positive half-line R^+). This method is a generalisation of the probability integral transformation, which states that if U is uniformly distributed on $(0, 1)$, then $X = G^{-1}(U)$ has distribution function $G(x)$. The generalisation is to let U take a non-uniform distribution F on $(0, 1)$, depending on those extra parameters, so that X has distribution function $F(G(x))$. The main supervisor currently prefers alternative methods of creating families of distributions on R but is less sure of the relative worth of the described approach on R^+ . The aim of this project would be to explore the latter via a literature review, by exploring general properties of the families of distributions on R^+ (in particular the shapes of their hazard functions), and through bespoke construction/choice of F to work well on R^+ . This project is principally theoretical/methodological, but with scope to pursue and develop practical applications if successful in the former terms.

Background reading/references

- Jones, M.C. (2004) Families of distributions arising from distributions of order statistics (with discussion). *Test*, **13**, 143.
- Jones, M.C. (2015) On families of distributions with shape parameters (with discussion). *International Statistical Review*, to appear.