ON SOME GENERALIZATION OF MIXTURES OF EXPONENTIAL DISTRIBUTIONS WITH APPLICATIONS TO RISK THEORY

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Section 12: Probability and Statistics

The class of mixtures of exponential distributions i.e. distributions of the type

$$F(t) = E\left(1 - \exp\{-\xi t\}\right) \tag{1}$$

and two classes of distributions

$$F(t) = E\left(1 - \exp\left\{-\xi t - \int_0^t g_1(u)du\right\}\right) \tag{2}$$

$$F(t) = E\left(1 - \exp\left\{-\xi \int_0^t g_2(u)du\right\}\right) \tag{3}$$

which can be considered as generalizations of exponential mixtures are discussed.

Here ξ is a nonnegative random variable, $g_1(\cdot)$ is a nonnegative function and $g_2(\cdot)$ is a nonnegative function such that $\int_0^\infty g_2(u)du = \infty$.

I propose applications of the distributions (1)–(3) as life time models and demonstrate large number of explicit representations of distributions from mentioned classes as well as their hazard rate functions (mortality rates)

$$\lambda(t) = \frac{F'(t)}{1 - F(t)}$$

and average residual life times

$$\mu(t) = \frac{1}{1 - F(t)} \int_t^\infty (1 - F(u))du.$$

Some asymptotic properties are also considered.

Methods of dealing with ruin probabilities for risk processes with claim distributions of types (1)–(3) are discussed.

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