INSA de Toulouse
Département GMM
BE - Processus de Poisson et Application en actuariat et fiabilité - 5 ModIA
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An insurance type modeling for the Ruin of forests

Keywords : insurance, sustainability

Context of the project

The main goal of this project is to study the ruin phenomenon in a Cramér-Lundberg type model when the ressources are trees in a forest. Recall the classical Cramér-Lundberg model for modeling the risk process (wealth) as :

$$R_t = u + ct - \sum_{i=1}^{N_t} Y_i, \quad t \geq 0. \tag{1}$$

The aim of the project is to study a similar model for accounting the ressources of a forest (trees) and to study the population subject to climat hazard.

Work to be performed

The work asked to the students goes in two different directions. The main ressource will be the article [1].

Theoretical results

The students are expected to describe the modeling of this situation and to make explicit computations when possible for particular cases for the ruin probability (that will be understood in this context as a probability of extinction).

Numerical results

Numerical simulations will illustrate the non-explicit examples to understand the impact of the parameters of the climate hazard on the extinction probability. The numerical simulations, will be presented in a Notebook Python (only).

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References

[1] P. Yiou and N. Viovy. Modelling the ruin of forests under climate hazards. *Earth system interactions with the biosphere: ecosystems*, 12(3):P.997 – 1013., 2020.