Applications of Computer Algebra – ACA 2019
Montréal, Canada | July 16-20, 2019
École de technologie supérieure

Using a CAS-developped random samples generator for teaching and researching in probabilistic cellular automata and Statisctics

Gabriel Aguilera-Venegas[1]***, José L. Galán-García***[1]***, María Á. Galán-García***[1]***, Pedro Rodríguez-Cielos***[1]***, Yolanda Padilla-Domínguez***[1]***, María Galán-Luque***[1] [gaguilera@uma.es]

[1] University of Málaga, Málaga, Spain

Our group introduced random samples generation using a CAS, specifically Derive, in the Derive session of ACA 2009. This talk was extended in a paper published in The Derive Newsletter [1].

We are now researching in extensions of the Conway's Game of Life, specifically using probabilistic cellular automata. Our long-term goal is the simulation of the growth of cancerous tissues. We have made an experience, supervising a master thesis with the preliminar works in this topic. For the generation of random numbers involved in the probabilistic automata of this work, we have used the results developed in the previous mentioned work. A summary of this work is about to be published in Advances in Computational Mathematics [2]. This work is both, an education and a research experience for the student who carried out the master thesis.

Moreover, the experience of teaching the subject Statistics to engineering students using the material developed for random samples generation has turned out to be useful in the teaching and learning process. The marks obtained in this subject by the students are statistically significantly better than the marks obtained by students of the same subject in others group of engineering where this material has not being used. A brief statistical study of the situation is carried out.

Keywords
Random samples generation, probabilistic automata, Game of Life, CAS.

References

[1] J.L. GALÁN, G. AGUILERA, P. RODRÍGUEZ, Y. PADILLA, M.A. GALÁN, *Random distributions.mth: Random samples from distributions with Derive.* The Derive Newsletter, 75, pages: 22-43, 2009. I.S.S.N.: 1990-7079.

[2] G. AGUILERA-VENEGAS; J. L.GALÁN-GARCÍA; R. EGEA-GUERRERO, M. Á. GALÁN-

GARCÍA, P. RODRÍGUEZ-CIELOS, Y. PADILLA-DOMÍNGUEZ, M. GALÁN-LUQUE, A probabilistic extension to Conway's Game of Life *Advances in Computational Mathematics* (in press). DOI: https://doi.org/10.1007/S10444-019-09696-8.