

Simulating random fuzzy data

González-Rodríguez, G.; Colubi, A.; Trutschnig, W.

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Fuzzy random variables model random experiments in which outcomes are associated with imprecise values which can be properly described by means of fuzzy sets. Formally, fuzzy random variables are a special kind of functional random elements. However, fuzzy data are not in a linear space, although the usual arithmetic induces a conical structure in the space of fuzzy sets. Since functional data are usually supposed to belong to a Hilbert space, it is difficult to apply directly the usual techniques for simulating functional random elements to generate random fuzzy data. One of the procedures used in Hilbert spaces to generate random functional data is connected with the simulation of the coefficients of the expansions of the functions in terms of a given basis. Although one cannot consider this kind of basis in the space of fuzzy data due to the lack of linearity, in some sense one can mimic such approach. A way to generate random fuzzy data inspired by this idea is introduced. A set of elements playing the role of a basis is considered, and it is analyzed in connection with the simulation of fuzzy data in different situations. Some illustrations of the effect of considering certain random perturbations of the coefficients are also shown.