

Continuous probabilities, random points, Bernoulli theorems, and geometric probability applications

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Abstract

Comte de Buffon is generally regarded as the founder of geometrical probability (GP) due the presentation of the franc-carreau and the needle problems at the French Royal Academy of Sciences in 1733. Nevertheless, the first known GP problem is from Newton circa 1665, but only published in 1967. In these problems the counting of events was replaced by its measure calculation (length, area, volume and so on). In 1884 Czuber published the first monograph solely devoted to GP. In the French school, the GP also occupies a prominent position in the major books on probability, such as the ones from Laplace, Bertrand, Bachelier, Poincaré or Borel. On the other hand, the estimate of a probability can be performed by the random point count, a crucial idea which gave rise in the XIX century to the estimate of π by carrying out random throws. Moreover, the accuracy of the estimates increases with the number of points as a consequence of the stochastic convergence results.

In Portugal, Pacheco dAmorim (1914) devotes a cumbersome and messy chapter of his doctoral thesis to the explanation of random figures. Nevertheless, his ideas of estimation based on random throws and on the Bernoulli's theorems are in fact the bases of many current applications of GP.

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