DOING FOR UNCERTAINTY WHAT ARABIC NUMERALS DID FOR NUMBERS

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ABSTRACT

Uncertainties are typically expressed in terms of probability distributions represented as cumulative or density functions. In general, it is impossible to perform arithmetic with such representations. Suppose soybean yield is normally distributed with a mean and standard deviation of 200 and 30 bushels/acre, respectively. And suppose the price per bushel is lognormal with a median and 90th percentile of $9 and $12 respectively. What is the resulting distribution of revenue? The Open SIPmath Standard(TM) represents such uncertainties as vectors of simulated or historical realizations and metadata called Stochastic Information Packets (SIPs). SIPs have similar group properties to numbers, so the SIP of revenue is merely the SIP of yield multiplied element by element times the SIP of price. SIPs are platform agnostic, and are at home in R and Python. But the Data Table function in Excel can also perform calculations on SIPs using the same keystrokes used for numbers.