Statistical Distributions: Continuous, Discrete, Properties and simulations

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1. **INTRODUCTION**

A probability distribution is a mathematical function that provides the probabilities of the occurrence of various possible outcomes in an experiment. Probability distributions are used to define different types of random variables in order to make decisions based on these models. There are two types of random variables: discrete and continuous. Depending on what category the random variable fits into, a statistician may decide to calculate the mean, median, variance, probability, or other statistical calculations using a different equation associated with that type of random variable. This is important because, as experiments may become more complicated, the standard formulas that are used to calculate these parameters (like the mean) will no longer produce accurate results.

1. **CONTINUOUS DISTRIBUTION**

A continuous distribution is associated with continuous variables, meaning the variable can take an infinite number of values within a specific range. A classic example of a continuous distribution is the normal or Gaussian distribution. In a normal distribution, possible measurements can be any real number within the range from negative infinity to positive infinity. A key aspect of a continuous distribution is that the probability of obtaining a specific value is, in fact, zero. Instead, the probability is calculated for obtaining a value within an interval. For example, the probability that a normal random variable fall between two specific values is represented by the area under the normal probability curve between those two values.Immagine che contiene linea, schermata, Policromia, arte

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1. **Discrete Distributions**

On the other hand, a discrete distribution is associated with discrete variables, meaning the variable can take only specific and distinct values. A common example of a discrete distribution is the binomial distribution. For instance, in a coin toss, the variable can only take the values of heads or tails, which are distinct and separate. Unlike continuous distributions, in discrete distributions, it is possible to assign a specific probability to each individual value. For example, in the binomial distribution, you can directly calculate the probability of obtaining a specific number of successes in a certain number of trials.

