**probability and its types**

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What does probability mean? Give some examples. What are the various types of probabilities?

If some one asks us if it’ll rain tomorrow, we can make a guess by looking at how the environment is. A meteorologist uses different varieties of tools and can use the statistical data readily available to him to make a more relatively refined prediction of whether it’ll rain or not. Be it guessing the weather or flipping a coin or in the game of Blackjack, once cannot be certain of the occurrence of an event but we can only predict the possibility of an outcome. This prediction is what is called as probability. This is broadly used in different sectors such as sports, gaming, betting, health industry to name a few.

Probability can be defined as “the likelihood of the occurrence of an event”. A simple formula to calculate probability is

Probability =  (Event) / (Total no. of outcomes)

For example: The probability of getting a 3 when a dice is rolled can be calculated as

(No. of sides with 3)/(Total no. of sides)=1/6

For independent events that can occur without any dependency on the previous event, it can be defined as

p(A and B) = p(A) \* p(B)

In the case of dependent events where the outcome of the first event affects the occurrence of the second event, it is defined as

p(A and B) = p(A) \* p(B|A)

There are three major types of probabilities which are listed below:

**Theoretical Probability:**

In theoretical probability, we do not conduct the actual experiment but instead based on the logical reasoning and mathematical theory, we calculate the probability of an event happening. It can be defined as the number of favorable outcomes divided by the no. of possible outcomes. For eg: the theoretical probability when two dice are rolled, both will land on 3 can be calculated as,

No. of favorable outcomes=1

No. of possible outcomes=36

Hence Theoretical probability is 1/36.

**Experimental probability:**

Experimental probability can be defined as the probability that is determined from the results of an experiment conducted multiple times.

Experimental probability of an event = (no. of times the event occurs)/(no. of times the experiment conducted).

For example: If rolling a dice 50 times times has resulted in the number 3 ten times, Experimental probability is calculated as 10/50.

**Axiomatic probability:**

The Axiomatic approach to probability refers to the axioms of probability that apply to the different types of probability. This is generally based on Kolgomorov’s three Axioms which are listed below.

1. For any event E, the probability p(E) is >=0.
2. The probability of the entire outcome space represented by p(s)=1.
3. If there are two disjoint events, the probability of the union of these two events which is denoted by p(A U B) = p(A) + p(B).

For example: When we roll a dice, the probability of outcome 3 is 1/6 and the same can be said for the outcome 2. The probability of the outcome to be either 2 or 3 is

P (2 U 3) = (1/6 )+( 1/6 ) = 1/3

One important thing to understand is that the probability can be applied to those experiments where the total number of outcomes are known i.e we can apply the concept of probability if the no. of outcomes is unknown.

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