InterviewBit

Probability Interview Questions

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29. The likelihood that people A and B could each independently solve the given problem is 1/2 and 1/3, respectively.

Let's get Started

What is Probability?

Probability is a branch of mathematics that calculates the likelihood of a specific event occurring, as a number between 1 and 0. A 1 denotes a specific event: for example, the probability of tossing a coin and getting "heads" or "tails" is 1, as there are no other outcomes unless the coin lands on its edge. The probability of a toss resulting in "heads" is ½ , because it is equally as likely to result in "tails." Events with a probability of 0 are considered impossible. For example, the probability of a coin landing without either side facing up is 0, as either "heads" or "tails" must be facing up. Probability theory is used to quantify imprecise and random measurements despite its paradoxical nature.

In this article, we are going to cover the **Probability Questions asked in [Data Science Interviews](#)** basis on various concepts like dependent and independent events, Bayes' theorem, Binomial Distribution, and many more for freshers as well as for experienced professionals.

Probability Interview Questions for Freshers

1. What is the chance of rolling at least one five with two dice?

Let’s assume that event A is that we get 5 on 1st dice and B is that we get 5 on 2nd dice

- Since the outcome of throwing the second die wouldn't be affected by the outcome of throwing the first dice, we can calculate the probability of independent events A and B both occurring as: **$P(A \cap B)=P(A) * P(B)$**
- The probability of getting at least one 5 can be computed using the probability of the union of two events:
  - $P(A \cup B)=P(A)+P(B)-P(A \cap B)$The probability of getting any specific outcome from a die is ⅙.
  - Thus, $P(A \cup B)=1/6+1/6-1/(6*6)=1/3-1/36=11/36$

Thus the probability of rolling at least one five with two dice is **11/36.**

2. Given that a die is rolled twice and the sum of the numbers is noted to be 6, what is the conditional probability that the number 4 has occurred at least once?

If you roll the dice twice, you'll get the following sample space:

S = { (1,1)(1,2)(1,3)(1,4)(1,5)(1,6)

(2,1)(2,2)(2,3)(2,4)(2,5)(2,6)

(3,1)(3,2)(3,3)(3,4)(3,5)(3,6)

(4,1)(4,2)(4,3)(4,4)(4,5)(4,6)

(5,1)(5,2)(5,3)(5,4)(5,5)(5,6)

(6,1)(6,2)(6,3)(6,4)(6,5)(6,6)}

Provided the given data, calculate the probability that 4 has appeared at least once, given that the sum of the numbers is 6.

Assume that F: The total of two numbers is six.

Take E, for example, 4 has appeared at least once.

As a result, we must locate P(E|F).

Obtaining P (E):

The chances of collecting four at least once are:

E = (1, 4), (2, 4), (3, 4), (4, 4), (5, 4), (6, 4), (4, 1), (4, 2), (4, 3), (4, 5), (4, 6), (4, 1), (4, 2), (4, 3), (4, 5), (4, 6)

As a result, P(E) = 11/36.

Identifying P (F):

The chance of getting the sum of two numbers is 6:

F = {(1, 5), (5, 1), (2, 4), (4, 2), (3, 3)}

As a result, P(F) = 5/ 36

In addition, E ∩ F = {(2,4), (4,2)}

P(E ∩ F) = 2/36

As a result, P(E|F) = (P(E ∩ F)) / (P (F))

Now, Substitute the computed probability values= (2/36)/ (5/36)

Hence, 2/5 is the required probability.

3. Team A and B are competing in a game in which they must win four of the seven rounds to win.

What is the likelihood that they will play all seven rounds if A's chance of winning is p and B's chance of winning is 1-p (no chance of a tie)? What if the chances of A winning differ on the home field (p) and the away field (q)?

If two teams compete in all seven rounds, both A and B must win three times in the first six rounds, regardless of who wins the final round. Each round can be thought of as a Bernoulli trial, with the number of times A wins in the first six games following a binomial distribution. The probability of A winning is Bi(n,k,p), with n=6, k=3, and p=p. The probability of A winning three times out of six games, according to the Binomial distribution, is:

$$Bi(6,3,p) = \binom{6}{3} *p^3*(1-p)^3 = \frac{6!}{3!*(6-3)!} *p^3*(1-p)^3 = 20p^3(1-p)^3$$

Because team A has won three times, team B has won three times as well. We can suppose that Team A's chance of winning at home is p, away is q, and Team A has won x games at home if the two teams have different winning percentages at home and away. x, p, and q will determine the likelihood of both teams playing all seven rounds. We know that both teams A and B must win three rounds and that Team A must win x games at home and 3-x games away, while Team B must win 3-x games away (Team A's home being Team B's visit site, and Team B wins aways when A loses at home) and win x rounds at home. Playing seven rounds has a probability of:

$$\binom{3}{x} *p^x*(1-p)^{3-x} * \binom{3}{x} *q^{3-x}*(1-q)^x$$

4. What is the likelihood of drawing two cards with the same suite (from the same deck)?

This is an illustration of a dependent event. According to this definition, the likelihood that two events will occur in the case of a dependent event is:

The probability of events A and B occurring simultaneously is equal to the chance of events A occurring multiplied by the likelihood of events B occurring given the outcome of events A.

This is expressed as $P(A \cap B) = P(A) * P(B|A)$

In this scenario, a deck of cards comprises four suites, each of which contains 13 cards.

Our chance of getting a card from a certain suite in the initial draw would be 13/52. Our chances of drawing a card from the same suite as the previous one in the subsequent draw would drop from 13/52 to 12/51.

Hence P(two cards same suite)

=4 ∗ 13/52 * 12/51

=4/17

5. We choose two cards at random from a deck of cards with numbers ranging from 1 to 100. What is the likelihood that a number on one card is precisely twice the number on the other?

With the idea of a combination, this query can also be resolved. This is due to the fact that the order is unimportant when we draw two cards from the same deck of cards. As a result, receiving a card with the number 10 in the first draw and the number 40 in the second draw is equivalent to receiving a card with the number 40 in the first draw and the number 10 in the second.

Input values from the question into the combination equation will provide the following results:

C(100,2) =100!/(100-2)!2! = 4950 combinations

Hence there are 4950 combination pairings available.

Given that we have 100 cards altogether, there are 50 ways out of those 4950 combinations where one card is double another.

As a result, we may determine the probability as:

50/4950 = 0.01 = 1%

6. What is the probability of rolling the dice seven times and receiving a 5?

Simply entering values into the binomial distribution equation will provide the solution to this query. Assuming that there have been 1 success and 7 trials, we can say that there have been 1 success and 7 trials. As we all know, there is a 1 in 6 chance of getting a 5 on a single throw.

The probability mass function (PMF) of the binomial distribution is as follows:

$$P(X=k) = \binom{n}{k} p^k (1-p)^{n-k}$$

Hence by putting values we get,

$$P(X=k) = \binom{7}{1} \frac{1}{6} (1-\frac{1}{6})6 = 0.397$$

7. N riders receive a $5 off voucher. P is the likelihood that a coupon will be used. What is the company's anticipated cost?

Different from the previous question, now we need to compute the expected value of a variable with binomial distribution instead of computing the PMF. We can answer this question by plugging the values into the equation of the expected value of the binomial distribution.

From the equation above, we have *N* coupons and the probability of using a coupon is *P*.

Thus, the expected value would be: $E(X)=N*P$

And the anticipated expense would be: $E(X)*5\$=N*P*5$

8. What is the variance's definition?

The variance measures the range of data points in a dataset in relation to its mean value, as the notion suggests. The general formula for a variance is given below:

$$S^2 = \frac{\Sigma(xi - \bar{x})^2}{n-1}$$

Where n is the total number of samples, x is the sample, x bar is the sample mean, and S is the variance.

9. What is a p-value? If you had a different (far larger, 3 mil records, for example) data set, would it affect how you interpret the p-value?

In the world of statistics, the term "p-Value" refers to the probability value, which is typically applied during hypothesis testing. When your null hypothesis is true, the facts you just observed are considered to be very unlikely, according to the p-value.

Typically, a significance level is established before hypothesis testing. We reject the null hypothesis if the p-value is less than the threshold we consider significant. In the meantime, if the p-Value exceeds the level of significance, we proceed with our null hypothesis.

The meaning of the p-Value is unaffected by the size of your dataset, although a larger dataset yields a more solid and trustworthy conclusion from our p-Value.

10. Assume Facebook users click on ads P times out of every 100. What is the smallest sample size N such that Probability(ABS(hat{P}-P) DELTA) = 95 percent when we choose a sample of size N and analyze the sample's conversion rate, denoted by hat{P}?

Find the smallest sample size N that will allow our sample estimate of P to be, with a 95% confidence level, within a DELTA of the actual click-through rate P.

The understanding of confidence intervals, the margin of error, sample size, and binomial distribution is tested by this question. The conversion rate in the hypothetical situation has a binomial distribution, so we must calculate the standard deviation using the square root of the variance of the binomial distribution.

The following is the general equation for the binomial distribution's variance:
Var(X)=p(1-p)

Our understanding of the question's 95 per cent confidence interval results in a Z-score of 1.96. (see the Z-table to obtain this value). When we enter the following equation into the equation margin of error, we obtain:

$$\delta = 1.96 * \sqrt{\frac{P(1-P)}{N}}$$

$$N >= 1.96^2 * \frac{P(1-P)}{(\delta)^2}$$

11. Out of 100 goods, 25 are of poor quality. What is the range of confidence?

We must calculate the sample mean from the expected value of the binomial distribution and the standard deviation from the variance of the binomial distribution because the problem in the question has a binomial distribution:

E(X) = 100*0.25E(X)=100∗0.25

Var(X)=100*0.25*(1-0.25)=18.75

We can simply enter the computed mean and standard deviation into the equation for confidence intervals to determine the result after computing them using the binomial distribution method.

$$CI = \bar{X} \pm \frac{Z * \sigma}{\sqrt{n}}$$

X bar is the sample mean, Z is the confidence value, σ is the sample standard deviation, and n is the sample size in the equation above.

So after putting values we get

$$CI = 25 \pm \frac{1.96 * 18.75}{\sqrt{100}}$$

12. How do you determine whether assignment to the different buckets in an A/B test was indeed random?

In terms of statistics, there wouldn't be any discernible disparities between the variable samples in each bucket if the buckets were actually chosen at random. However, how can we tell if the sample differences between the buckets are meaningful or not?

To assess this, we can perform a statistical test.

The two-sample t-test can be used if the variables we observe are continuous variables and there is only one treatment. In the meanwhile, we can utilize ANOVA if there are numerous treatments.

We can utilize the p-Value obtained after running a statistical test to determine whether there is a significant difference between buckets.

13. What distinguishes probability density functions from probability mass functions?

- **Probability mass function:-** The probability distribution for discrete variables is provided by the Probability Mass Function (PMF). For instance, throwing dice. The complete sample space is defined by 6 unique outcomes: 1, 2, 3, 4, 5, and 6. We only have whole numbers; there are no fractions like 1.2 or 3.75. Each discrete variable's probability is mapped to the PMF. Each of the six factors has a 1/6 chance of being rolled in an ideal environment when rolling a die.
- **Probability density function:-**The probability distribution of the continuous random variables is provided by the Probability Density Function. we use a probability distribution function where outcome values are not fixed like we have a range of values as outcomes for example if we try to calculate the height of students in a class we get the value in range. The probability density function is calculated by the area under the curve of the interval in which or outcome values lie.

14. What is a Probability Distribution?

A probability distribution is a statistical function that outlines every conceivable value and likelihood that a random variable could have within a specified range.

Two main categories of probability distribution exist:

- **Discrete probability distributions:** used random variables having discrete outcomes, such as the frequency of heads in five consecutive coin tosses, the number of rainy days in a particular week, the number of goals a player scores, etc.,
- **Continuous probability distributions:** used for random variables with continuous outcomes, such as the average height of male students, the median price of a home in San Francisco, the number of claims a given insurance provider receives, and so forth.

15. How would you use Bayes' Rule to test hypotheses?

We can calculate a conditional probability using new information we already have using the Bayes' Rule equation. In the case of two distinct events A and B, we can consider the following two events in terms of Baye's theorem:

- Hypothesis A, which may be true or untrue
- Evidence A supporting B, which may be present or not.

As a result, A is the occurrence whose likelihood we are interested in. The issue can be stated as follows using Bayes' theorem:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

Where:

- The probability that event A will occur if event B is true is expressed as P(A|B). We are attempting to estimate what is also known as the posterior.
- P(B|A) is the likelihood that event B will occur assuming that event A is true. It can alternatively be understood as the probability of witnessing the new data given our prior hypothesis, and it can also be understood as the likelihood.
- The probabilities of seeing A and B, P(A), and P(B), respectively, in the absence of any specific conditions, are also known as the prior and marginal probabilities.

Now, in order to compare the two hypotheses, we compute their respective probabilities using the previous technique. Acceptance is given to the hypothesis with the highest posterior probability.

Probability Interview Questions for Experienced

16. How many advertisements should be expected to appear in 100 news stories for each option?

There are two ways we can serve advertising inside Newsfeed:

1. Every 25 stories, there will be one advertisement.
2. There is a 4% possibility that every story contains an advertisement.

How many advertisements should be expected to appear in 100 news stories for each option? What is the likelihood that a user will only see one ad out of every 100 stories if we choose option 2?

The expected value and binomial distribution PMF are both tested in this question.

The first query, which concerns the anticipated number of advertisements displayed in 100 news pieces, is: `E(ads shown) =100*4/100=4`

The PMF of a binomial distribution can be used to provide an answer to the second query, where there are 100 total trials, one success (a single ad), and a 0.04 probability that each story would contain an advertisement.

$$P(X=k) = \binom{100}{1} * 0.04 * (1-0.04)^{99} = 0.07$$

17. Let's say you roll a dice and get the face you roll. Let's say you get another chance to roll the die. If you roll, you receive the face you obtain and keep your winnings from the previous round. When should the second roll be made?

The outcome of a roll of a 6-sided die is predicted to be: `E(x)=1/2*(1+6)= 3.5`

To respond to this query, we must consider it in the following manner:

We shouldn't roll the second die and instead keep the winnings if the first roll yields more than 3.5 (the expected value of one roll). While waiting, we should roll the second die if our result is less than 3.5.

18. A discount coupon is given to 2 riders. The probability of using a coupon is P. Given that at least one of them uses a coupon, what is the probability that both riders use the coupons?

You will be tested on your understanding of the Bayes theorem and the binomial distribution in this question.

The probability that exactly one cyclist will use the coupon can be calculated using the binomial PMF:

$$P(X=1) = \binom{2}{1} * P^1 * (1-P) = 2 * P * (1-P)$$

The PMF of a binomial distribution can also be used to calculate the likelihood that both of them will use the coupon.

$$P(X=2) = \binom{2}{2} * P^2 * (1-P)^{2-2} = P^2$$

As per normal, the next step is to describe an event so that we may better grasp what each item in the Bayes' theorem equation means,

- A= At least one rider has used the coupon.
- B = The voucher is used by both riders

The values can now be entered as follows into the Bayes' theorem equation:

P(B|A)= [P(A|B)*P(B)] / P(A)

= (1* P^2) / 2*P *(1-P) + P^2

= P/ (2-P)

The 30 probability and statistics interview questions from various companies are concluded at this point. We believe these inquiries will help you hone your abilities so you can ace your data science interview. Remember that you won't be able to answer interview questions about statistics and probability in one sitting; rather, you'll develop the capacity over time by learning consistently.

19. There are two types of coins: one fair (one side heads, one side tails) and one unfair(both sides tails). You choose one at random, flip it five times, and note that it lands on tails each time. What is the probability of you tossing an unfair coin?

Here, the Bayes Theorem can be used. Let U stand for the scenario in which we flip an unfair coin and F for the scenario in which we flip a fair coin. We are aware that P(U) = P(F) = 0.5 since the coin is picked at random. Let 5T stand for the scenario in which we consistently flip 5 heads. After that, assuming that we saw 5 tails in a row, we are interested in finding a solution for P(U|5T), or the likelihood that we are tossing an unfair coin.

Since the unjust coin will always land on heads, we know P(5T|U) = 1. Furthermore, we are aware that P(5T|F) = 1/25 = 1/32 according to the concept of a fair coin. Using the Bayes Theorem, we can:

$$P(U \mid 5T) = \frac{P(5T \mid U) * P(U)}{P(5T \mid U) * P(U) + P(5T \mid F) * P(F)} = \frac{0.5}{0.5 + 0.5 * 1/32} = 0.97$$

Therefore, there is a 97 per cent chance that we chose the unjust coin.

20. A and B are playing a game where each player flips all of their coins. A has n+1 coins, and B has n coins. What is the probability that A will have more heads than B?

Compare the first n coins flipped by A to the n coins flipped by B.

There are three potential outcomes:

1. More heads are on A than B.
2. Equal numbers of heads are present in A and B.
3. A is headless compared to B.

Keep in mind that A will always win in scenario 1 (regardless of coin n+1), while A will always lose in scenario 3 (regardless of coin n+1). These two scenarios have an equal chance of happening because of symmetry.

Put x for any scenario's probability and y for scenario 2's probability.

Since there are only 3 events that can occur, we know that 2x + y = 1. Let's now think about coin n+1. A will have prevailed if the coin lands face up with a probability of 0.5 under scenario 2. (which happens with probability y). As a result, A's overall odds of winning the game increase by 0.5y.

So, the likelihood that player A will prevail in the game is: `x+1/2y =x+!/2(1-2x) =1/2`

21. A and B are participating in a game of archery together. Assume that both of their arrow-firing skills are identical and that both have a 0.5 chance of hitting the target.

What is the probability that A will hit more targets than B given that A has fired 201 arrows and B has fired 200?

Since 201 is not an even number, let's start with 200 games. Assume that in 200 games, event A is A shooting more arrows on target than event B, event B is B shooting more arrows on target, and event C is they both shoot the same number of arrows on targets. We possess

Given that A and B compete evenly in 200 games of archery, we obtain **P(A) = P. (B)**. Thus:

Now switch to the additional game that player A plays. if over the previous 200 games:

- If A is higher than B, then A remains higher than B whether A hits the target in this additional game or not.
- If A is less than B, then A will still not be more than B even if A fires on target for the additional game.
- If A=B and A hits the target in the additional game, then A will be higher than B and there is a 0.5 chance that A will hit the target in any game.

As a result, the overall likelihood that A surpasses B is:

Since 2P(A) + P(C) = 1, we can divide 2 into both sides to get the following result:

```
P(A)+P(C)=0.5
```

When A plays 201 games and B plays 200 games, there is a 0.5 per cent chance that A will score more targets than B.

22. You have 40 cards total, with 10 each of red, green, blue, and yellow. There is a number from 1 to 10 for each color. What is the likelihood that two cards you draw without a replacement will not be the same color or have the same number?

The odds of receiving two cards with the same number and two cards of the same color can be calculated first, and the result is one less than the total of the two probabilities.

The likelihood of drawing two identical cards is as follows: P(Same Number) = 40/40*(9/39) = 9/39

Any number can be drawn in the first draw, regardless of significance. As a result, the likelihood is unaffected by the first draw; but, because there are only 39 cards available, you must choose the same number for the second draw. There are four cards with the same number on them, each in a different color. You can only choose three cards from a total of 39 for the second draw.

The same reasoning applies if you get two cards of the same color: P(Same colour) = 40/40*(9/39) = 9/39

In the initial draw, we can choose any color, but we can only select nine cards from the remaining 39 of the same hue. The likelihood of not receiving the same card AND the same number is:

P = 1-P(Same Number)-P(Same colour) = 27/39

23. Eight people enter an elevator in a building with ten floors. What is the expected number of stopping? What assumptions do you need to calculate this expectation?

We can use the binomial distribution to answer this question if we model each passenger's decision to halt on a particular floor as a Bernoulli trial. The presumptions comprise:

- 8 passengers make autonomous choices;
- assume that all occupants enter on the first floor and that there are ten options ranging from one to ten floors. (There are only 9 options if you assume no one stops at the first floor.)

There are eight passengers in all, and the elevator will stop if anyone wishes to exit for any reason. Instead of figuring out how likely it is that the elevator will stop at a specific floor, we may figure out how likely it is that it won't stop. The likelihood that the elevator won't stop at any floor, for any floor, is: **(9/10)^8**

The likelihood that the elevator will stop at any floor is **1-(9/10)^8**

Assume that X is a random variable with the elevator's stopping frequency and that X has a binomial distribution to get the predicted number of stops in this situation

```
$X  ~ Bi(10,(1-(9/10)^8))$
```

If n=10, then p=1-(9/10)^8 The binomial distributed random variable's expected value is np: `E(x)=10*1-(9/10)^8`

24. Assume there is a highly uncommon disease in the world. There is a 0.1 per cent chance that anyone will contract this illness. You decide to take a test to find out if you are infected, and the results are affirmative.

99% of those who have the condition will test positive, and 99 percent of those who do not will test positive, according to the test's accuracy (many thanks to Xavier Lavenir for clarifying the assumptions in the question). What are the odds that you are really ill? (We are grateful to Dennis Meisner for spotting the misinterpretation here.)

Assume that event A has the illness and that event B tested positive. According to the details in the query:

P(B|A) = 99.9 percent, and 1 percent of those who tested positive don't have the condition, therefore P(B|not A) = 1 percent; if P(A) = 0.1 percent, then P(not A) equals 99.9 per cent

P(A|B) is what?

Bayes' Theorem: **P (A|B) = [P(B|A) P(A)] / P(B)**

And,

P(B) = P(B|A) * P(B|A) * P(A) + P(B | notA) * P (notA)

Plug in every number:

P(A|B) = (0.99*0.001)/(0.99*0.001+0.01*0.999) = 9%

All of the questions have answers in the list below. I hope that reading this essay will help you hone your probability theory skills.

25. In order to win the game, Team A and Team B must win 4 of the game's 7 rounds.

What is the likelihood that they will play all seven rounds if the probability of A winning is p, the probability of B winning is 1-p, and there is no chance of a tie? What if the odds that team A wins differ on the home field (p) and the visiting field (q)?

If two teams compete in all 7 rounds, both A and B must win exactly 3 times in the first 6 rounds; the last round's winner is irrelevant. If we think of each round as a Bernoulli trial, then the distribution of how many times A wins in the first 6 games is binomial. Bi(n,k,p) with n=6, k=3, and p=p gives the likelihood that A will prevail. The likelihood that player A will win 3 out of every 6 games is, according to the binomial distribution:

$$Bi(6, 3, p) = \binom{2}{2} * p^3 * (1-p)^3 = \frac{6!}{3! * (6-3)!} * p^3 * (1-p)^3 = 20p^3(1-p)^3$$

Keep in mind that when team A wins three times, team B automatically wins three times

We can assume Team A's likelihood of winning at home is p, Team A's probability of winning away is q, and Team A has won x games at home if the two teams have different winning percentages playing at home and playing away. The likelihood that both teams will participate in all 7 rounds will depend on the variables x, p, and q. We know that team A and team B must each win 3 rounds in order to advance, and that team A must win x games at home and 3-x games away, while team B must win 3-x games away (team B visits team A's home, therefore team B wins away games when A loses at home) and win x rounds at home. The likelihood of seven rounds being played is

$$\binom{3}{x} * p^{x} * (1-p)^{3-x} * \binom{3}{x} * q^{3-x} * (1-q)^{x}$$

We can learn more about the likelihood if we have additional information about the distribution of x.

26. On each corner of an equilateral triangle, three zebras are seated. Each zebra chooses a direction at random and proceeds solely around the triangle's perimeter to either of its opposite edges. What is the likelihood that no zebras will collide?

Consider the zebras as being arranged in an equilateral triangle. If they are going down the outline to each edge, they each have two possible ways to travel in. Let's calculate the likelihood that they won't collide given that the scenario is random.

Actually, there are just two options. Either all of the zebras will opt to move in a clockwise or counterclockwise direction as they run.

Let's determine the likelihood of each. The likelihood that each zebra will choose to move in a clockwise direction will be determined by the sum of their individual decisions. Given that there are two options (clockwise or counterclockwise), the answer is 1/2 * 1/2 * 1/2, which equals 1/8.

The likelihood of each zebra turning counterclockwise is 1/8. As a result, when the probabilities are added together, we obtain the proper probability of 1/4, or 25%.

27. Your flight to Seattle is ready to take off. You dial the numbers of three unrelated random friends who reside there to inquire about the weather.

Each of your buddies has a 2/3 chance of being honest with you and a 1/3 chance of playing a practical joke on you by lying. It is raining, as all three of your buddies confirm. What is the probability that Seattle is experiencing rain right now?

You must assume something about the likelihood of rain in Seattle in order to respond to this question. Say the value is 0.5.

Since each of our pals has a 2/3 chance of being honest, there is a 2/3 chance that Seattle will experience rain if our friends are correct. Given that our friends predict that it won't rain in Seattle, the likelihood of it not raining is also 23.

Let's define an event as follows in light of this:

- A= a rainy day in Seattle.
- A' = not raining in Seattle
- Xi = random variable with a Bernoulli distribution, and its value corresponds to the response provided by our friends: raining (1) or not (0)

By using Bayes' theorem, we can therefore approximatively determine the likelihood that it will rain in Seattle provided that our friends predict that it will.

$$P(A \mid X_1 = 1 \cap X_2 = 1 \cap X_3 = 1)$$

$$\frac{\frac{1}{2} * \frac{1}{2}^3}{\left(\frac{2}{3}^3 * \frac{1}{2}\right) + \left(\frac{2}{3}^3 * \frac{1}{2}\right)} = 0.888$$

28. Imagine you attended a technical job interview.

50% of those who participated in the first interview received a call for the second interview. Those who received a call for a second interview felt positive about it in 95% of cases. Seventy-five per cent of those who did not get a follow-up contact were satisfied with their initial interview. What is the probability that you will be called back for a second interview if your first interview went well?

Assume that 100 participants participated in the initial interview process. For the second round of interviews, 50 candidates received calls. Out of this, 47.5 per cent, or 95 per cent, agreed that their interview went well. 50 persons were not called for the interview; of those, 37.5 (or 75% of them) felt happy about it.

Thus, a total of (37.5 + 47.5) 85 participants reported feeling positive after conducting their interview.

As a result, only 47.5 of the 85 candidates who felt excellent received the call for the following stage. The likelihood of success is, therefore (47.5/85) = 0.558.

Using the Bayes theorem, one can elegantly answer the following question:

- A: Feeling good after your initial interview.
- B: A call inviting you to a second interview.

Now,

P(A) = 0.5 * 0.95 + 0.5*0.75 = 0.85

P(B) = 0.

P(A|B) = 0.95

Hence,

P(B|A) equals [P(A|B)*P(B)]. / P(A) = (0.95 * 0.5)/0.85 = **0.558**

29. The likelihood that people A and B could each independently solve the given problem is 1/2 and 1/3, respectively.

Given that, the two events say A and B are independent if P(A ∩ B) = P(A). P(B)

We can see from the data that P(A) = 1/2 and P(B) = 1/3.

The likelihood that a problem will be solved is equal to the likelihood that either person A or person B will do so.

The following can be written:

= P(A ∪ B) = P(A) + P(B) – P(A ∩ B)

P(A B) Equals P if A and B are independent (A). P(B)

Change the values now,

= (1/2) × (1/3)

P(A ∩ B) = 1/6

The likelihood of a problem being solved is now expressed as

P(Problem solved) equals P(A) plus P(B) minus P(A B).

= (1/2) + (1/3) - (1/6)

= (3/6) + (2/6) - (1/6)

= 4/6

= 2/3

The likelihood that the problem will be solved is therefore 2/3.

30. Three groups A, B & C are competing for positions on the Board of directors of a company.

The probabilities of their winning are 0.5, 0.3, and 0.2 respectively. If group A wins, the probability of introducing a new product is 0.7 and the corresponding probabilities for groups B & C are 0.6 & 0.5 respectively. Find the probability that the new product will be introduced.

Given P(A) = 0.5, P(B) = 0.3 and P(C) = 0.2

therefore P(A) + P(B) + P(C)=1

then events A, B, and C are exhaustive.

If P(E)= Probability of introducing a new product, then as given

P(EIA)=0.7, P(EIB)=0.6 and P(EIC) = 0.5

P(E) = P(A). P(EIA) + P(B). P(EIB) + P(C). P(EIC)

= 0.5 x 0.7 +0.3 x 0.6+0.2 x 0.5= 0.35 +0.18+0.10 = **0.63**

31. Given three identical boxes I, II, and III, each containing two coins.

In box I, both coins are gold coins, in box II, both are silver coins and in box III, there is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is of gold, what is the probability that the other coin in the box is also of gold?

Let E1, E2, and E3 be the events that boxes I, II and III are chosen, respectively. Then P(E1)=P(E2)=P(E3)=⅓

Also, let A be the event that 'the coin drawn is of gold'

Then P(AIE1) = P(a gold coin from box I) = 2/2=1

P(AIE2) = P(a gold coin from box II) = 0

P(AIE3) = P(a gold coin from box III) = ½

Now, the probability that the other coin in the box is gold

= the probability that a gold coin is drawn from box I.

= P(E1IA)

By Baye's theorem, we know that

$$P(E_1|A) = \frac{P(E_1)P(A|E_1)}{P(E_1)P(A|E_1)+P(E_2)P(A|E_2)+P(E_3)P(A|E_3)} = \frac{\frac{2}{3}*1}{\frac{2}{3}*1+\frac{1}{3}*0+\frac{1}{3}*\frac{1}{2}} = \frac{2}{3}$$

Conclusion

Probability theory is a branch of mathematics concerned with the analysis of random phenomena. Probability is used whenever we want to predict the outcome of some event before it happens it is widely used in making machine learning models like predicting weather forecasts in the betting industry, determining prices and making trading decisions, and many more. This article discussed probability interview questions ranging from every concept of probability that can be asked in the interview like dependent and independent events, permutations and combinations, Bayes theorem, and many more so by solving these questions you will get the overall idea of the probability.

Important Resources

- [Statistics Interview Questions]
- [Data Science And Machine Learning - Problems]
- [Best Data Science Courses]
- [Top Data Scientist Skills]
- [Naive Bayes Algorithm]
- [Coding Interview Questions]
- [Technical Interview Questions]

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