Mathematics of Computer Science. – M.I.T. opencourseware

Abstract:
For against just intuitive choice, mathematician count all the cases of event and make it meaningful information. That is probability. Probability is used in bunch of fields such as cryptography, math, science, in every field that wanna make a better choice. So we measure the probability as precies as possible to make risk down and decision with higher value.

For the English:
occurs, die, against intuition

Lec 18. PROBABILITY INTRODUCTION:

– Monty Hall Game
In TV show – Let's make a deal, they shows the player three doors that 2 out of them behind there are goats and rest one have diamond ring or fancy car.
First the player chose one door and then Monty Hall opened other door that had goat behind. Second, player can chose whether switch their door or stick with it. And what is the probability of getting diamond ring if player switch their door?

DEF: the <u>sample space</u> for an experiment is the set of all possible outcomes
DEF: an <u>outcome</u>(a.k.a <u>sample point</u>) consist of all the info about the experiment, after it has been performed, including all random choices
DEF: an outcome of the Monty Hall game when the contestant switches consist of:
     1. box with prize   2. bax chosen by contestant   3. box revealed
ex) sample point(2 1 3) is where the prize is in box 2, player picks box 1, Carol reveal box 3.
● (1 2 1) or (2 1 1) is not a sample point // (1 1 2) or (1 1 3) are possible

we are constructing the sample space – the tree method
however the tree show 50% of win or lose
{(112) (113) (123) (132) (213) (221) (223) (231) (312) (321) (331) (332)}
that caused by wrong space

DEF: a probability space consist of a sample space S and a probability function
"Pr" : S -> R s.t.   1) $\forall w \in S$, $0 =< P(w) =< 1$ // 2) $\sum Pr(w) == 1$
Interpretation : $\forall w \in S$, Pr(w) = probability that w will be outcome

– Assumption
1) the prize is in each box with prob – 1/3
2) no matter where prize is, player picks each box with prize – 1/3
3) no matter where the prize is, if Carol has choice she picks each box with prob – 1/2

probability of a sample point is the product of the probability on the path in the tree leading to the sample point(outcome)

1/18 + 1/18 + 1/9 + 1/9 + 1/9 + ... 1/18 + 1/18+ 1/9 + 1/9 .. = Win 6/9 = 2/3
L   L   W   W   W   L   L   W   W

DEF: an event is a subset of the sample space
ex) El = event of losing with switch strategy
DEF: the probability that an event occurs is $\sum Pr(w)$ / $w \in E$
ex) Pr(el) = 6*1/18 = 1/3

- 3 dices with 6 number
                        A) 2, 6, 7   B) 1, 5, 9   C) 3, 4, 8
DEF: a sample space is uniform every sample point has the same Pr(w) = 1/|S|

C beats A prob 5/9 => 가위바위보   A>B>C>A
sample space = 9   no fair in here with 2 player...
but if roll twice, the answer is reversed   A<B<C<A