## **Information Content**

What is Information content?

1. Consider the Random variable SR which maps to the direction in which the sun rises: East, West, North & South.
   1. Now, we are told that P(SR=East) is 1.
   2. Here, this is almost a blatantly obvious truth, thus we can say that the Information Gained here is very low.
2. Consider another Random variable ST, which maps to whether there is going to be a storm today: Yes, No.
   1. Now, we are told that P(ST=Yes) = 1
   2. Here, the information gained is very high as this is a rather surprising(low probability) event
   3. We can almost say that
   4. Or in other words
   5. Thus, it can be inferred that the information content is a function of the probability of the event
   6. Where IC is information content
3. Now, consider two separate events
   1. X maps to which cricket team won the match: A, B, C, D
   2. Y maps to the state of a light switch: On, Off
   3. Now we are told that Team B won the match AND the light switch is On
   4. The total Information gained is
4. Combining the points from above, we have
   1. (Information Content is a function of probability)
   2. (From the previous example)
   3. From probability theory, if P(X) and P(Y) are disjoint, then
   4. Therefore
   5. Therefore we need a family of function that satisfy
   6. The log functions satisfy this
5. Now we can write the IC function as follows
   1. (All the logs use base 2)