

# Information

Experience shows that the **information value** of certain *news* depends on their probability.

$$I_{E_i} = f(p_i)$$

in which  $I_{E_i}$  means the information value. In this aspect the more unexpected or unlikely (rumour) a *news* is the bigger its *news* value.

So the  $f$  function was selected according to Shannon's suggestion:

$$I_E = \log_2 \frac{1}{p_E} = -\log_2(p_E) \text{ [bit]}$$

The properties of a logarithm function play an important role in the modeling procedure of the quantitative properties of a given information.

If an event space consist of two equal-probability event  $(p(E_1) = p(E_2) = 0.5)$  then,

$$I_{E_1} = I_{E_2} = \log_2 \frac{1}{0.5} = -\log_2 0.5 = 1 \text{ [bit]}$$

So the unit of the information means the news value which is connected to the simple, less likely, same probability choice.

If the event system consist of 'n' number of events and all these events have the same probability then the probability of any event is the following:

$$p_E = \frac{1}{n}$$

In these cases, the news value which is connected to these events will be the following:

$$I_E = \log_2 \frac{1}{p_E} = \log_2(n) \text{ [bit]}$$

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