

Other complicated way of $H(U_0|U_1...U_M)$

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Abstract

Prove experimentally one hypothesis.

1 Introduction

Knowing that:

$$H(U_0|U_1U_2) = h_b(p_1) + h_b(p_2) - h_b(p_1||p_2) \quad (1)$$

where the operator “||” work the next way: $a||b \equiv a + b - 2ab$. Also $a||b||c \equiv a + b + c - 2ab - 2ac - 2bc + 4abc$. It was see experimentally that

$$H(U_0|U_1U_2U_3) \approx \begin{aligned} & h_b(p_1) + h_b(p_2) + h_b(p_3) \\ & - h_b(p_1||p_2) - h_b(p_1||p_3) - h_b(p_2||p_3) \\ & + h_b(p_1||p_2||p_3) \end{aligned} \quad (2)$$

and

$$\begin{aligned} H(U_0|U_1U_2U_3U_4) \approx & h_b(p_1) + h_b(p_2) + h_b(p_3) + h_b(p_4) \\ & - h_b(p_1||p_2) - h_b(p_1||p_3) - h_b(p_1||p_4) \\ & - h_b(p_2||p_3) - h_b(p_2||p_4) - h_b(p_3||p_4) \\ & + h_b(p_1||p_2||p_3) + h_b(p_1||p_2||p_4) \\ & + h_b(p_2||p_3||p_4) + h_b(p_1||p_3||p_4) \\ & - h_b(p_1||p_2||p_3||p_4) \end{aligned} \quad (3)$$

(??) and (??) were prove experimentally as true. Them, my hypothesis is:

$$\begin{aligned} H(U_0|U_1...U_M) \approx & (-1)^{1+1} \sum_{a_1} h_b(p_{a_1}) \\ & (-1)^{2+1} \sum_{a_1, a_2} h_b(p_{a_1}||p_{a_2}) \\ & (-1)^{3+1} \sum_{a_1, a_2, a_3} h_b(p_{a_1}||p_{a_2}||p_{a_3}) \\ & \vdots \\ & (-1)^{M+1} \sum_{a_1, \dots, a_M} h_b(p_{a_1}||\dots||p_{a_M}) \end{aligned} \quad (4)$$

$$\begin{aligned}
H(U_1 \dots U_M) \approx & \sum_{a_1, a_2}^{+1} (-1)^2 h_b(p_{a_1} || p_{a_2}) \\
& \sum_{a_1, a_2, a_3} (-1)^3 h_b(p_{a_1} || p_{a_2} || p_{a_3}) \\
& \vdots \\
& \sum_{a_1, \dots, a_M} (-1)^M h_b(p_{a_1} || \dots || p_{a_M})
\end{aligned} \tag{5}$$

1.1 Demonstration

References

- [1] Abrardo, A.; Ferrari, G.; Martalò, M.; Perna, F. Feedback Power Control Strategies in Wireless Sensor Networks with Joint Channel Decoding. *Sensors* 2009, 9, 8776-8809. doi:10.3390/s91108776
- [2] Ferrari, G.; Martalo, M.; Abrardo, A.; Raheli, R., "Orthogonal multiple access and information fusion: How many observations are needed?," *Information Theory and Applications Workshop (ITA)*, 2012 , vol., no., pp.311,320, 5-10 Feb. 2012. doi: 10.1109/ITA.2012.6181783