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ON THE MAXIMIZATION OF THE SET OF ε-TYPICAL SEQUENCES OF A MARKOV SOURCE OF A SPECIAL TYPE

Theorem

Let $(\mathcal{A}, \vec{p}, \mathbb{P})$ be a stationary simple binary Markov source,

$$\mathbb{P} = \begin{pmatrix} 1-\alpha & \alpha \\ 1 & 0 \end{pmatrix}$$

Then the entropy of the source is

$$\mathrm{H}_\infty = \frac{1}{1+\alpha}\,\mathrm{h}(\alpha), \quad \max_\alpha \mathrm{H}_\infty(\alpha) = \mathrm{H}_\infty(1-\frac{1}{\phi}),$$

where $\phi = \frac{1+\sqrt{5}}{2}$ is golden ratio. The source possesses the property of asymptotic equipartition, and for all $\varepsilon > 0,\ 0 < \delta < 1$

$$\frac{1-\delta}{2^{n\cdot\varepsilon}} \cdot \phi^n \leqslant |A_{n,\varepsilon}| \leqslant 2^{n\cdot\varepsilon}\phi^n,$$

$$(2^{-\varepsilon}\cdot\phi^{-1})^n \leqslant \mathrm{P}_{1,2,\ldots,n}(a^n) \leqslant (2^{\varepsilon}\cdot\phi^{-1})^n, \text{ for any } a^n \in A_{n,\varepsilon}.$$

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