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160043336 AN Info IV

Demostrar: $H(S(\lambda)) = \lambda H_1 + \bar{\lambda} H_2 + H(\lambda)$

$$H(S) = \sum_S P(s_i) \log \frac{1}{P(s_i)}$$

$$H(S(\lambda)) = \lambda P_1 \log\left(\frac{1}{\lambda P_1}\right) + \lambda P_2 \log\left(\frac{1}{\lambda P_2}\right) + \dots + \lambda P_{q_1} \log\left(\frac{1}{\lambda P_{q_1}}\right) +$$
$$\bar{\lambda} Q_1 \log\left(\frac{1}{\bar{\lambda} Q_1}\right) + \bar{\lambda} Q_2 \log\left(\frac{1}{\bar{\lambda} Q_2}\right) + \dots + \bar{\lambda} Q_{q_2} \log\left(\frac{1}{\bar{\lambda} Q_{q_2}}\right)$$

$$H(S(\lambda)) = \lambda P_1 \left[\log\left(\frac{1}{\lambda}\right) + \log\left(\frac{1}{P_1}\right)\right] + \lambda P_2 \left[\log\left(\frac{1}{\lambda}\right) + \log\left(\frac{1}{P_2}\right)\right] + \dots +$$
$$\lambda P_{q_1} \left[\log\left(\frac{1}{\lambda}\right) + \log\left(\frac{1}{P_{q_1}}\right)\right] + \bar{\lambda} Q_1 \left[\log\left(\frac{1}{\bar{\lambda}}\right) + \log\left(\frac{1}{Q_1}\right)\right] +$$
$$\bar{\lambda} Q_2 \left[\log\left(\frac{1}{\bar{\lambda}}\right) + \log\left(\frac{1}{Q_2}\right)\right] + \dots + \bar{\lambda} Q_{q_2} \left[\log\left(\frac{1}{\lambda}\right) + \log\left(\frac{1}{Q_{q_2}}\right)\right]$$

$$H(S(\lambda)) = \lambda P_1 \log\left(\frac{1}{\lambda}\right) + \lambda P_1 \log\left(\frac{1}{P_1}\right) + \lambda P_2 \log\left(\frac{1}{\lambda}\right) + \lambda P_2 \log\left(\frac{1}{P_2}\right)$$
$$+ \dots + \lambda P_{q_1} \log\left(\frac{1}{\lambda}\right) + \lambda P_{q_1} \log\left(\frac{1}{P_{q_1}}\right) + \bar{\lambda} Q_1 \left(\frac{1}{\lambda}\right) + \bar{\lambda} Q_1 \left(\frac{1}{Q_1}\right) +$$

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$$\bar{\lambda} Q_2 \log\left(\frac{1}{\bar{\lambda}}\right) + \bar{\lambda} Q_2 \log\left(\frac{1}{Q_2}\right) + \ldots + \bar{\lambda} Q_{q_2} \log\left(\frac{1}{\bar{\lambda}}\right) + \bar{\lambda} Q_{q_2} \log\left(\frac{1}{Q_{q_2}}\right)$$

$$H(S(\lambda)) = \lambda \log\left(\frac{1}{\lambda}\right)\left[P_1 + P_2 + \ldots + P_{q_1}\right] + \quad (= 1)$$

$$\underbrace{\lambda\left[P_1 \log\left(\frac{1}{P_1}\right) + P_2 \log\left(\frac{1}{P_2}\right) + \ldots + P_{q_2}\left(\frac{1}{P_{q_1}}\right)\right]}_{H_1} +$$

$$\bar{\lambda} \log\left(\frac{1}{\bar{\lambda}}\right)\left[Q_1 + Q_2 + \ldots + Q_{q_2}\right] + \quad (= 1)$$

$$\underbrace{\bar{\lambda}\left[Q_1 \log\left(\frac{1}{Q_1}\right) + Q_2 \log\left(\frac{1}{Q_2}\right) + \ldots + Q_{q_2} \log\left(\frac{1}{Q_{q_2}}\right)\right]}_{H_2}$$

$$H(S(\lambda)) = \lambda H_1 + \bar{\lambda} H_2 + \lambda \log\left(\frac{1}{\lambda}\right) + \bar{\lambda} \log\left(\frac{1}{1-\lambda}\right)$$

$$H(S(\lambda)) = \lambda H_1 + \bar{\lambda} H_2 + \underbrace{\lambda \log\left(\frac{1}{\lambda}\right) + (1-\lambda) \log\left(\frac{1}{1-\lambda}\right)}_{H(\lambda)}$$

$$H(S(\lambda)) = \lambda H_1 + \bar{\lambda} H_2 + H(\lambda)$$