Appendix

A Experiment 1: 300 dpi Resolution

Original document: [arXiv:2106.13823] Page-3
Image file: 2106.13823v3-P3-300.jpg
Image resolution: 300 dots per inch (dpi)
Number of output tokens: 453
Total Entropy: 7.77 bits
Normalized Entropy: 0.0171 bits

Recognized Math Equations:

$$Q(N,\rho,\epsilon) = \sum_{x\in\epsilon\text{-strong-typical}} |i_1\rangle\langle i_1| \otimes |i_2\rangle\langle i_2| \otimes \cdots \otimes |i_N\rangle\langle i_N|. \tag{11}$$

$$\text{tr}\left(Q(N,\rho,\epsilon)\rho^{\otimes N}\right) \geq 1-\delta. \tag{12}$$

$$\text{tr}\left(Q(N,\rho,\epsilon)\rho^{\otimes N}\right) = \sum_{x\in\epsilon\text{-strong-typical}} P(i_1)P(i_2)\cdots P(i_N) = \sum_{x\in\epsilon\text{-strong-typical}} P(x). \tag{13}$$

$$\langle l\rangle = \sum_{i=1}^{D} p_i l_i = \sum_{i=1}^{D} p_i \log\frac{1}{q_i} = H(p,q), \tag{16}$$

$$H(p,q) \leq \langle l\rangle < H(p,q)+1. \tag{17}$$

$$\sigma = \sum_{i=1}^{D} q_i |a_i\rangle\langle a_i|, \quad \rho = \sum_{i=1}^{D} p_i |b_i\rangle\langle b_i|, \quad \{q_i\} \neq \{p_i\}, \quad \{|a_i\rangle\} \neq \{|b_i\rangle\}. \tag{15}$$

B Experiment 2: 150 dpi Resolution

Original document: [arXiv:2106.13823] Page-3
Image file: 2106.13823v3-P3-150.jpg
Image resolution: 150 dpi
Number of output tokens: 434
Total Entropy: 12.28 bits
Normalized Entropy: 0.028 bits;

Recognized Math Equations:

$$Q(N,\rho,\epsilon) = \sum_{|i\rangle\in\epsilon\text{-strong-typical}} |i_1\rangle\langle i_1| \otimes |i_2\rangle\langle i_2| \otimes \cdots \otimes |i_N\rangle\langle i_N|. \tag{11}$$

$$\mathrm{tr}\left(Q(N,\rho,\epsilon)\rho^{\otimes N}\right) \geq 1-\delta. \tag{12}$$

$$\mathrm{tr}\left(Q(N,\rho,\epsilon)\rho^{\otimes N}\right) = \sum_{x\in\epsilon\text{-strong-typical}} P(i_1)P(i_2)\cdots P(i_N) = \sum_{x\in\epsilon\text{-typical}} P(x). \tag{13}$$

$$H(p,q) = \sum_{i=1}^{D} p_i \log\frac{1}{q_i} = H(q,p), \tag{16}$$

$$H(p,q) \leq \langle l\rangle < H(p,q)+1. \tag{17}$$

$$\sigma = \sum_{i=1}^{D} q_i |a_i\rangle\langle a_i|, \quad \rho = \sum_{i=1}^{D} p_i |b_i\rangle\langle b_i|, \quad \{a_i\} \neq \{p_i\}, \quad \{a_i\} \neq \{b_i\}. \tag{15}$$

C Experiment 3: 96 dpi Resolution

Original document: [arXiv:2106.13823] Page-3

Image file: 2106.13823v3-P3-96.jpg

Image resolution: 96 dpi

Number of output tokens: 476

Total Entropy: 18.27 bits

Normalized Entropy: 0.038 bits

Recognized Math Equations:

$$Q(N,\rho,\epsilon) = \sum_{|i\rangle\ \epsilon\text{-strongly typical}} |i\rangle\langle i| \otimes |i_2\rangle\langle i_2| \otimes |i_N\rangle\langle i_N| \tag{11}$$

$$\mathrm{tr}\left(Q(N,\rho,\epsilon)\rho^{\otimes N}\right) \geq 1-\delta \tag{12}$$

$$\mathrm{tr}\left(Q(N,\rho,\epsilon)\rho^{\otimes N}\right) = \sum_{x\ \epsilon\text{-strongly typical}} P(i_1)P(i_2)\cdots P(i_N) = \sum_{x\ \epsilon\text{-strongly typical}} P(x) \tag{13}$$

$$(1-\delta)^2 2^{N(S(\rho)-\epsilon)} \leq T(N,\rho,\epsilon) \leq 2^{N(S(\rho)+\epsilon)} \tag{14}$$

$$\sigma = \sum_{i=1}^{D} q_i |a_i\rangle\langle a_i|, \quad \rho = \sum_{i=1}^{D} p_i |b_i\rangle\langle b_i|, \quad \{q_i\} \neq \{p_i\}, \quad \{|a_i\rangle\} \neq \{|b_i\rangle\} \tag{15}$$

$$l(x) = \left\lceil \log \frac{1}{q_x} \right\rceil = H(p,q) \tag{16}$$

$$H(p,q) \leq l(x) < H(p,q) + 1 \tag{17}$$

D Experiment 4: 72 dpi Resolution

Original document: [arXiv:2106.13823] Page-3

Image file: 2106.13823v3-P3-72.jpg

Image resolution: 72 dpi

Number of output tokens: 473

Total Entropy: 38.91 bits

Normalized Entropy: 0.082 bits

Recognized Math Equations:

$$Q(\mathcal{N},\rho,\epsilon) = \sum_{k:\langle k|\rho|k\rangle \geq \epsilon} |k\rangle\langle k| \otimes |k\rangle\langle k| \otimes |k\rangle\langle k| \tag{11}$$

$$\mathrm{tr}(Q(\mathcal{N},\rho,\epsilon)\rho^{\otimes n}) \geq 1-\delta \tag{12}$$

$$\mathrm{tr}(Q(\mathcal{N},\rho,\epsilon)\rho^{\otimes n}) = \sum_{x \in \epsilon\text{-strong-typical}} P(x)\cdot P(x)\cdot \ldots \cdot P(x) = \sum_{x \in \epsilon\text{-strong-typical}} P(x) \tag{13}$$

$$(1-\delta)2^{n(S(\rho)-\epsilon)} \leq P(\mathcal{N},\rho,\epsilon) \leq 2^{n(S(\rho)+\epsilon)} \tag{14}$$

$$\langle \ell \rangle = \sum_x P(x) \cdot \left\lceil \log \frac{1}{P(x)} \right\rceil = H(P,q) \tag{16}$$

$$H(q) \leq \langle \ell \rangle \leq H(q) + 1. \tag{17}$$

$$\sigma = \sum_i \lambda_i |\phi_i\rangle\langle\phi_i| = \sum_i p_i |\psi_i\rangle\langle\psi_i| \tag{18}$$