High-Resolution Image Synthesis with Latent Diffusion Models

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Nov 20, 2024

Contents

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The Development of AI-Generated Content (AIGC)

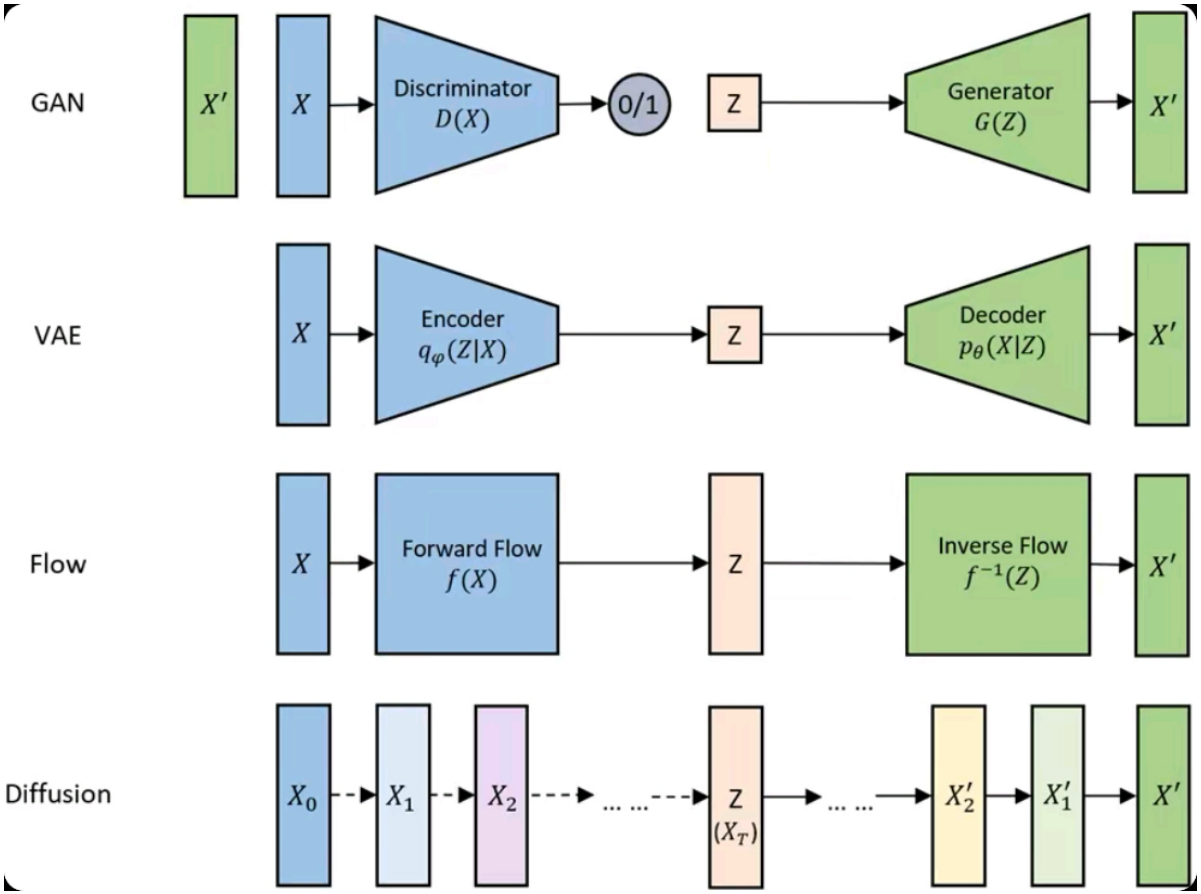

Figure 1: The development of AIGC and mobile edge computing network [1].

[1] M. Xu, et al., "Unleashing the power of edge-cloud generative AI in mobile networks: A survey of AIGC services," IEEE Commun. Surv. Tutor., Early Access, 2024.

Diffusion Model

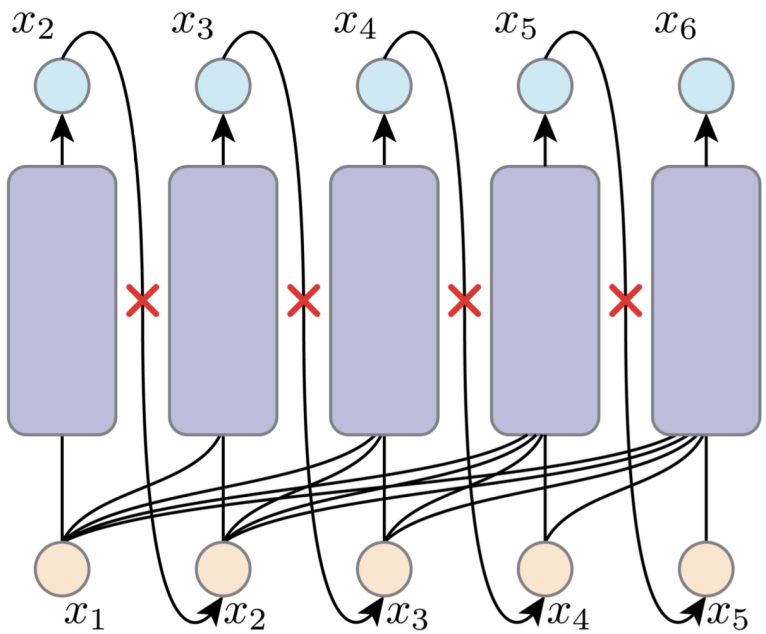

Figure 2: An illustration of diffusion model [2].

- With Gaussian noise as input
- The quality of generated images gets progressively better.

[2] H. Du, et al., "Enhancing deep reinforcement learning: A tutorial on generative diffusion models in network optimization," arXiv preprint arXiv:2308.05384, 2023.

AIGC in Mobile Edge Computing (MEC)

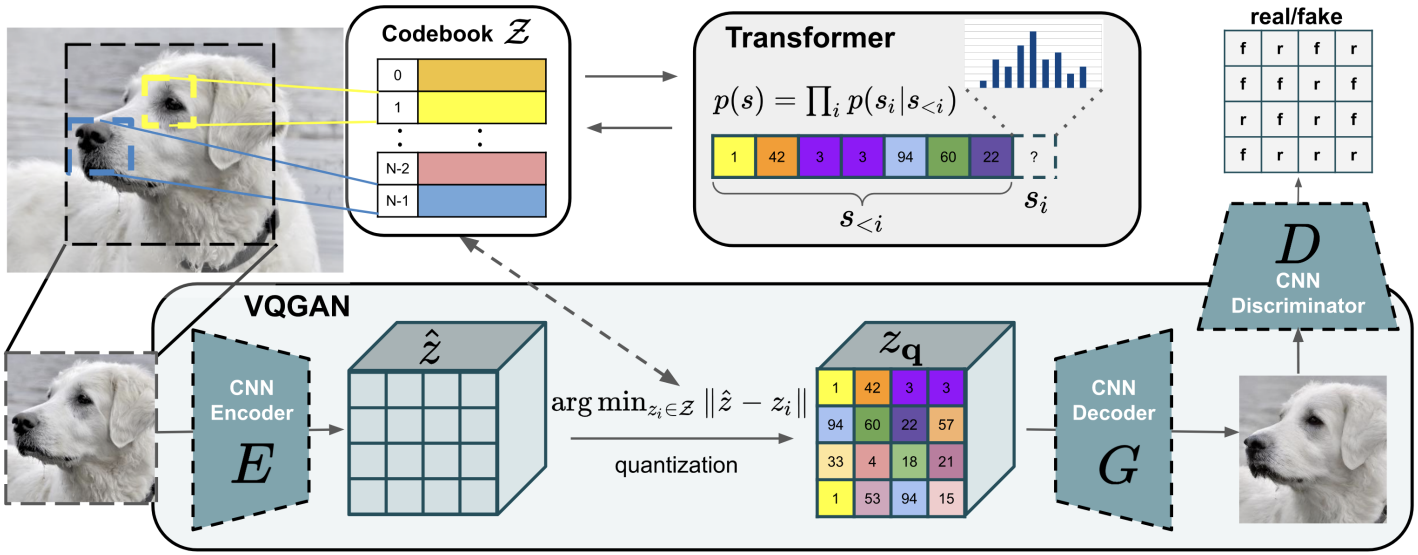

Figure 3: An overview of a mobile AIGC network [1].

- AIGC models can be deployed at edge servers.

[1] M. Xu, et al., "Unleashing the power of edge-cloud generative AI in mobile networks: A survey of AIGC services," IEEE Commun. Surv. Tutor., Early Access, 2024.

MEC Network

Local Processing Model

Home BS Processing Model

Neighbor BS Processing Model

Weighted Cost

Offloading Problem

Deep Reinforcement Learning based OSI Algorithm

- State:

$$\mathrm{s}_{\mathrm{n}}^{(\mathrm{l})} = \left(\mathrm{B}_{\mathrm{n}}^{(\mathrm{l})}, \mathrm{q}_{\mathrm{n}}^{(\mathrm{l})}, \mathrm{f}_{\mathrm{n}}^{\mathrm{U},(\mathrm{l})}, \mathrm{g}^{\mathrm{B},(\mathrm{l})}, \mathrm{h}_{\mathrm{n}}^{(\mathrm{l})}\right)$$

- Action:

$$\mathrm{a}_{\mathrm{n}}^{(\mathrm{l})} = \left(\mathrm{x}_{\mathrm{n}}^{(\mathrm{l})}, \mathrm{y}_{\mathrm{n}}^{(\mathrm{l})}, \mathrm{c}_{\mathrm{n}}^{(\mathrm{l})}\right)$$

- Reward:

$$\mathrm{r}_{\mathrm{n}}^{(\mathrm{l})} = -\sum_{\mathrm{n}\in\mathcal{N}} \left(\omega_1 \mathrm{T}_{\mathrm{n}}^{(\mathrm{l})} + \omega_2 \mathrm{E}_{\mathrm{n}}^{(\mathrm{l})} + \omega_3 \epsilon_{\mathrm{n}}^{(\mathrm{l})}\right) - \mathrm{r}_{\mathrm{n}}^{\mathrm{P},(\mathrm{l})}$$

- Conclusion 1.
- Conclusion 2.
- Conclusion 3.
- Conclusion 4.

Acknowledgements

Thanks for your listening!

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