

07 Modeling mechanism

Figure 1 coordinate 7 | Subitems 22, 23, 24

Machine learning

22 GAN

Latent code -> synthetic sample
Generator competes with critic
Goal: match the data distribution
Test realism and coverage

23 Diffusion

Noise -> denoised sample
Learn reversal over noise levels
Goal: learn the data distribution
Test quality / coverage / privacy

24 Flow matching

Sample + path time -> velocity
Learn source-to-data transport
Match a chosen probability path
Test velocity fit / coverage

Computer vision

— StyleGAN image synthesis

Latent styles -> face image
Control attributes across scales
Target scale-specific appearance
Test realism / latent coverage

— Latent diffusion synthesis

Text + latent noise -> image
Denoise a compressed code
Target content after decoding
Test prompts and fine details

— Rectified-flow transformer

Text + noise -> generated image
Learn transport on chosen paths
Target requested visual content
Test prompts at matched cost

Medical image analysis

— MedGAN PET-to-CT

PET image -> synthetic CT
Adversarial and feature losses
Target source anatomy retention
Test attenuation error / review

— Medical Diffusion volumes

Noise -> 3D MRI or CT
Denoising diffusion synthesis
Check anatomy / slice coherence
Test pathology / memorization

— Medical flow matching

Noise + class / mask -> image
Documented 2D / 3D synthesis
Target conditional anatomy
Test masks and lesion fidelity