Diffusion-Related-Papers-ICML-2025

Diffusion

Theory

1. **Diffusion models for Gaussian distributions: Exact solutions and Wasserstein errors.** [pdf]
2. **S4S: Solving for a Fast Diffusion Model Solver.** [pdf]
3. **Morse: Dual-Sampling for Lossless Acceleration of Diffusion Models.** [pdf]
4. **Target Concrete Score Matching: A Holistic Framework for Discrete Diffusion.** [pdf]
5. **REG: Rectified Gradient Guidance for Conditional Diffusion Models.** [pdf]
6. **Multidimensional Adaptive Coefficient for Inference Trajectory Optimization in Flow and Diffusion.** [pdf]
7. **Generalized Interpolating Discrete Diffusion.** [pdf]
8. **Local Manifold Approximation and Projection for Manifold-Aware Diffusion Planning.** [pdf]
9. **Provable Efficiency of Guidance in Diffusion Models for General Data Distribution.** [pdf]
10. **A Mixture-Based Framework for Guiding Diffusion Models.** [pdf]
11. **Provable Maximum Entropy Manifold Exploration via Diffusion Models.** [pdf]
12. **REG: Rectified Gradient Guidance for Conditional Diffusion Models.** [pdf]
13. **Stochastic Control for Fine-tuning Diffusion Models: Optimality, Regularity, and Convergence.** [pdf]
14. **Adjoint Sampling: Highly Scalable Diffusion Samplers via Adjoint Matching.** [pdf]
15. **Distillation of Discrete Diffusion through Dimensional Correlations.** [pdf]
16. **Differentiable Solver Search for Fast Diffusion Sampling.** [pdf]
17. **Is Noise Conditioning Necessary for Denoising Generative Models?.** [pdf]

Application

1. **AsymRnR: Video Diffusion Transformers Acceleration with Asymmetric Reduction and Restoration.** [pdf]
2. **Diffusion Adversarial Post-Training for One-Step Video Generation.** [pdf]
3. **IMPACT: Iterative Mask-based Parallel Decoding for Text-to-Audio Generation with Diffusion Modeling.** [pdf]
4. **DiTAR: Diffusion Transformer Autoregressive Modeling for Speech Generation.** [pdf]

5. **Q-VDiT: Towards Accurate Quantization and Distillation of Video-Generation Diffusion Transformers.** [pdf]
6. **Large Language Models to Diffusion Finetuning.** [pdf]
7. **Upcycling Text-to-Image Diffusion Models for Multi-Task Capabilities.** [pdf]
8. **Spherical-Nested Diffusion Model for Panoramic Image Outpainting.** [pdf]
9. **RIFLEx: A Free Lunch for Length Extrapolation in Video Diffusion Transformers.** [pdf]
10. **A First-order Generative Bilevel Optimization Framework for Diffusion Models.** [pdf]
11. **Ca2-VDM: Efficient Autoregressive Video Diffusion Model with Causal Generation and Cache Sharing.** [pdf]
12. **Zero-Shot Adaptation of Parameter-Efficient Fine-Tuning in Diffusion Models.** [pdf]
13. **History-Guided Video Diffusion.** [pdf]
14. **Human Body Restoration with One-Step Diffusion Model and A New Benchmark.** [pdf]
15. **Latent Diffusion Planning for Imitation Learning.** [pdf]

Inverse Problem

1. **Variational Control for Guidance in Diffusion Models.** [pdf]
2. **SITCOM: Step-wise Triple-Consistent Diffusion Sampling For Inverse Problems.** [pdf]
3. **Integrating Intermediate Layer Optimization and Projected Gradient Descent for Solving Inverse Problems with Diffusion Models.** [pdf]
4. **Stochastic Deep Restoration Priors for Imaging Inverse Problems.** [pdf]
5. **Noise Conditional Variational Score Distillation.** [pdf]
6. **Inverse Problem Sampling in Latent Space Using Sequential Monte Carlo.** [pdf]

Consistency Model

1. **Improving Consistency Models with Generator-Augmented Flows.** [pdf]
2. **Improved Discretization Complexity Analysis of Consistency Models: Variance Exploding Forward Process and Decay Discretization Scheme.** [pdf]
3. **VCT: Training Consistency Models with Variational Noise Coupling.** [pdf]
4. **Convergence of Consistency Model with Multistep Sampling under General Data Assumptions.** [pdf]

Diffusion Bridges

Schrödinger Bridge based

1. **Feature out! Let Raw Image as Your Condition for Blind Face Restoration.** [pdf]
2. **Neural Guided Diffusion Bridges.** [pdf]
3. **Categorical Schrödinger Bridge Matching.** [pdf]
4. **MixBridge: Heterogeneous Image-to-Image Backdoor Attack through Mixture of Schrödinger Bridges.** [pdf]
5. **Linear convergence of Sinkhorn's algorithm for generalized static Schrödinger bridge.** [pdf]
6. **DSBRouter: End-to-end Global Routing via Diffusion Schrödinger Bridge.** [pdf]
7. **Trajectory Inference with Smooth Schrödinger Bridges.** [pdf]

DDBMs based

1. **UniDB: A Unified Diffusion Bridge Framework via Stochastic Optimal Control.** [pdf]
2. **Inverse Bridge Matching Distillation.** [pdf]
3. **IRBridge: Solving Image Restoration Bridge with Pre-trained Generative Diffusion Models.** [pdf]
4. **FrameBridge: Improving Image-to-Video Generation with Bridge Models.** [pdf]

Flow Matching

Theory

1. **Multi-Marginal Stochastic Flow Matching for High-Dimensional Snapshot Data at Irregular Time Points.** [pdf]
2. **Computing Optimal Transport Maps and Wasserstein Barycenters Using Conditional Normalizing Flows.** [pdf]
3. **Variational Rectified Flow Matching.** [pdf]
4. **Controlled Generation with Equivariant Variational Flow Matching.** [pdf]
5. **INRFlow: Flow Matching for INRs in Ambient Space.** [pdf]
6. **Ensemble Distribution Distillation via Flow Matching.** [pdf]
7. **Flexible Tails for Normalizing Flows.** [pdf]
8. **Wasserstein Flow Matching: Generative Modeling Over Families of Distributions.** [pdf]
9. **SDE Matching: Scalable and Simulation-Free Training of Latent Stochastic Differential Equations.** [pdf]
10. **Elucidating Flow Matching ODE Dynamics via Data Geometry and Denoisers.** [pdf]
11. **Improving Flow Matching by Aligning Flow Divergence.** [pdf]
12. **An Error Analysis of Flow Matching for Deep Generative Modeling.** [pdf]
13. **Normalizing Flows are Capable Generative Models.** [pdf]
14. **Inverse Flow and Consistency Models.** [pdf]
15. **Gaussian Mixture Flow Matching Models.** [pdf]
16. **On the Guidance of Flow Matching.** [pdf]
17. **Stream-level Flow Matching with Gaussian Processes.** [pdf]

Application

1. **EraseAnything: Enabling Concept Erasure in Rectified Flow Transformers.** [pdf]
2. **FlowAR: Scale-wise Autoregressive Image Generation Meets Flow Matching.** [pdf]
3. **DeFoG: Discrete Flow Matching for Graph Generation.** [pdf]
4. **One Diffusion Step to Real-World Super-Resolution via Flow Trajectory Distillation.** [pdf]

AI4Science (with diffusion or flow)

1. **WyckoffDiff -- A Generative Diffusion Model for Crystal Symmetry.** [pdf]
2. **Kinetic Langevin Diffusion for Crystalline Materials Generation.** [pdf]
3. **Inverse problems with experiment-guided AlphaFold.** [pdf]
4. **All-atom Diffusion Transformers: Unified generative modelling of molecules and materials.** [pdf]
5. **GenMol: A Drug Discovery Generalist with Discrete Diffusion.** [pdf]
6. **Diffusion on Language Model Encodings for Protein Sequence Generation.** [pdf]
7. **Bridging Protein Sequences and Microscopy Images with Unified Diffusion Models.** [pdf]
8. **Reward-Guided Iterative Refinement in Diffusion Models at Test-Time with Applications to Protein and DNA Design.** [pdf]
9. **Open Materials Generation with Stochastic Interpolants.** [pdf]
10. **CellFlux: Simulating Cellular Morphology Changes via Flow Matching.** [pdf]
11. **All-atom inverse protein folding through discrete flow matching.** [pdf]
12. **Pretraining Generative Flow Networks with Inexpensive Rewards for Molecular Graph Generation.** [pdf]
13. **Energy-Based Flow Matching for Generating 3D Molecular Structure.** [pdf]
14. **Compositional Flows for 3D Molecule and Synthesis Pathway Co-design.** [pdf]
15. **Flexibility-conditioned protein structure design with flow matching.** [pdf]
16. **ReQFlow: Rectified Quaternion Flow for Efficient and High-Quality Protein Backbone Generation.** [pdf]
17. **Efficient Molecular Conformer Generation with SO(3)-Averaged Flow Matching and Reflow.** [pdf]
18. **LDMol: A Text-to-Molecule Diffusion Model with Structurally Informative Latent Space Surpasses AR Models.** [pdf]
19. **AffinityFlow: Guided Flows for Antibody Affinity Maturation.** [pdf]