Deep Denoising Autoencoder for MNIST

ISPR - Midterm 3

Assignment 1

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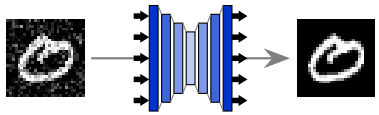
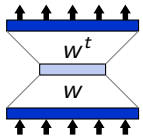
7 June 2021

Models description

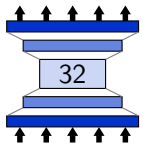
- Models trained to reconstruct input without noise

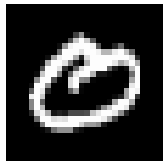
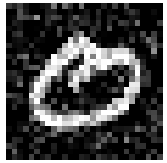
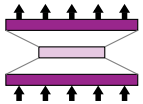
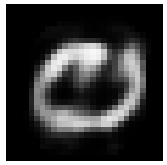
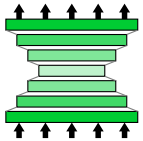
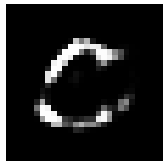
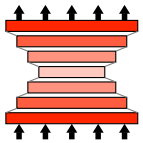
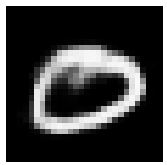
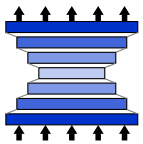
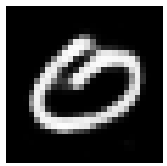


- Tied weights

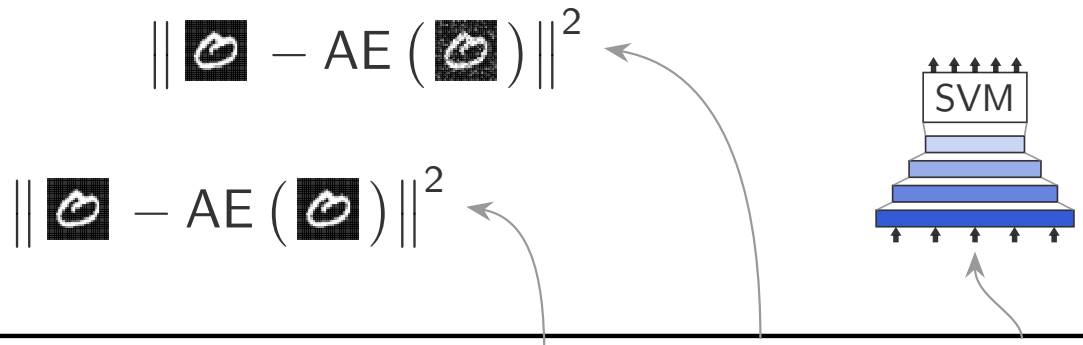


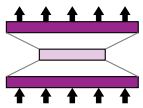
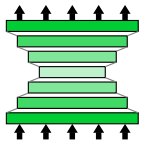
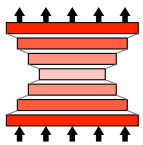
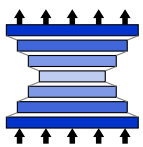
- Information bottleneck
  - Easier visualization
  - Best results with deep models
  - Secret project



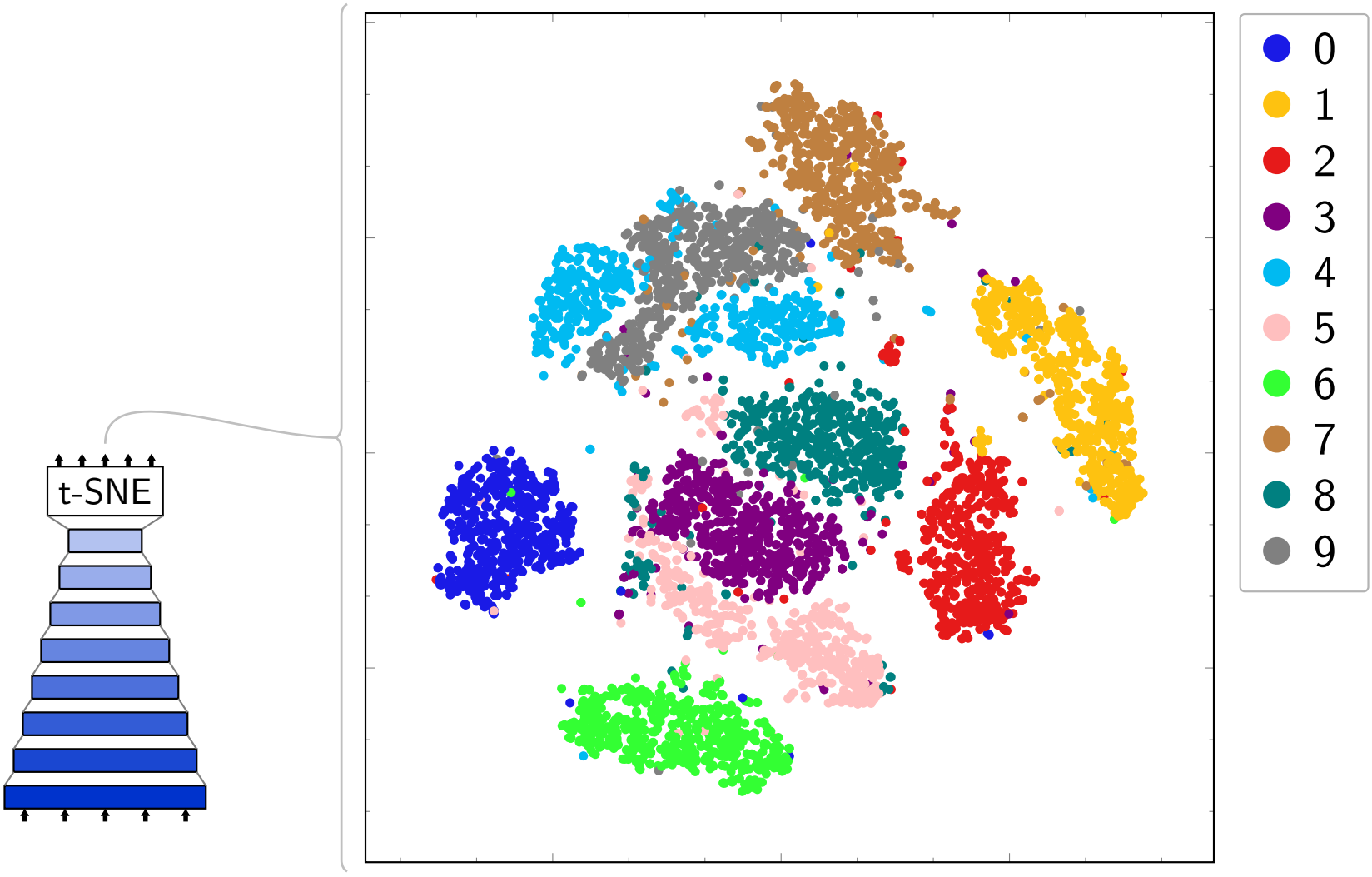
Ground truth		
Noisy input		
	• $1+1$ layers	
	• $8+8$ layers • greedy pretraining	
	• $8+8$ layers • random initialization with fine-tuning	
	• $8+8$ layers • greedy pretraining with fine-tuning	

Models evaluation



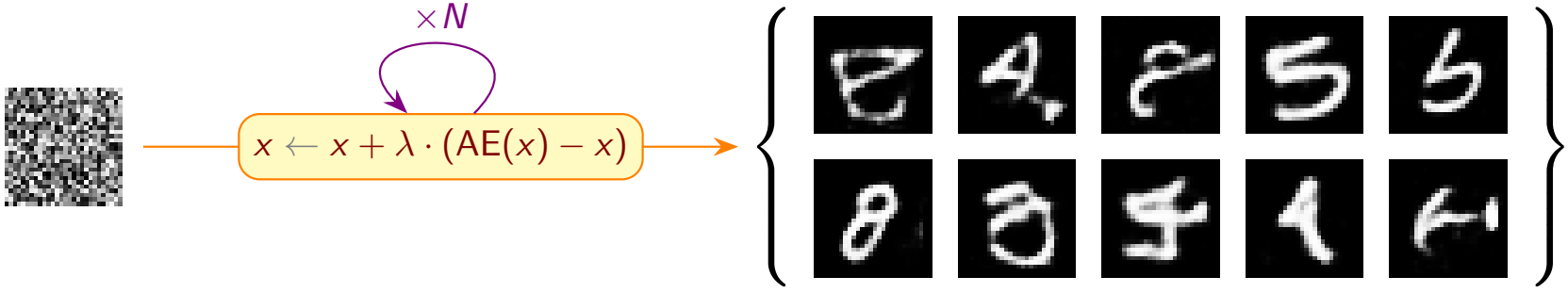
Model	MSE	MSE noisy	Classifier accuracy
 • $1+1$ layers	0.026	0.025	95.3 %
 • $8+8$ layers • greedy pretraining	0.056	0.048	97.2 %
 • $8+8$ layers • random initialization with fine-tuning	0.013	0.013	97.4 %
 • $8+8$ layers • greedy pretraining with fine-tuning	0.007	0.008	98.2 %

Latent space visualization



Experiments

Manifold learning



Digit morphing