Submit mode: vanilla (run locally and not parallelized), tmux (run locally, but parallelized using tmux) or qsub (run on cluster using qsub). For vanilla, sometimes the ' ' characters have to removed (e.g. for the jointly trained Fashion network, the ones for the grid have to be removed)

Train network

MNIST

Separately

python ./src/execute_settingI.py --file-name './mnist_vae_flex/src/main.py' --submit-mode 'vanilla' --grid "'5'" "'10'" "'15'" "'20'" "'40'" "'60'" "'80'" "'100'" "'125'" "'400'" "'784'"

Jointly

python ./src/execute_settingI.py --file-name './mnist_vae_flex/src/main.py' --submit-mode 'vanilla'

FASHION

Separately

python ./src/execute_settingI.py --file-name './generative_model_collections/main.py' --submit-mode 'vanilla' --gan-type VAE --epoch 25 --dataset fashion-mnist --grid "'5'" "'10'" "'15'" "'20'" "'40'" "'60'" "'80'" "'100'" "'200'" "'250'" "'784'"

Jointly

python ./src/execute_settingI.py --file-name './generative_model_collections/main.py' --submit-mode 'vanilla' --gan-type VAE --epoch 25 --dataset fashion-mnist --grid "'5 10 20 40 60 100 200 250'"

Projections

MNIST

Jointly trained

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'5 10 15 20 40 60 80 100'" --measurement-type project --flex-chosen 5 10 20 40 60 80 100 --num-measurements 784 --fair-counter 1 --max-update-iter 10000

Single trained:

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'5'" --measurement-type project --flex-chosen 5 --num-measurements 784 --fair-counter 2 --max-update-iter 10000

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'10'" --measurement-type project --flex-chosen 10 --num-measurements 784 --fair-counter 2 --max-update-iter 10000

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'20'" --measurement-type project --flex-chosen 20 --num-measurements 784 --fair-counter 2 --max-update-iter 10000

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'40'" --measurement-type project --flex-chosen 40 --num-measurements 784 --fair-counter 2 --max-update-iter 10000

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'60'" --measurement-type project --flex-chosen 60 --num-measurements 784 --fair-counter 2 --max-update-iter 10000

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'80'" --measurement-type project --flex-chosen 80 --num-measurements 784 --fair-counter 2 --max-update-iter 10000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'100'" --measurement-type project --flex-chosen 100 --num-measurements 784 --fair-counter 2 --max-update-iter 10000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'125'" --measurement-type project --flex-chosen 125 --num-measurements 784 --fair-counter 2 --max-update-iter 10000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'400'" --measurement-type project --flex-chosen 400 --num-measurements 784 --fair-counter 2 --max-update-iter 10000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types vae-flex --pretrained-model-dir './mnist_vae_flex/models/' --init-mode "previous-and-random" --grid "'784'" --measurement-type project --flex-chosen 784 --num-measurements 784 --fair-counter 2 --max-update-iter 10000

Sparsity-based

python ./src/sparsity_mnist.py --refresh --data_mode mnist
python ./src/sparsity_mnist.py --refresh --data_mode mnist --mode wavelet

FASHION

Jointly trained

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'5 10 20 40 60 100 200 250'" --measurement-type project --flex-chosen 5 10 20 40 60 100 200 250 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --input-type full-input

Single trained

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'5'" --measurement-type project --flex-chosen 5 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'10'" --measurement-type project --flex-chosen 10 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'20'" --measurement-type project --flex-chosen 20 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'40'" --measurement-type project --flex-chosen 40 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000

python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'60'" --measurement-type project --flex-chosen 60 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'100'" --measurement-type project --flex-chosen 100 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'200'" --measurement-type project --flex-chosen 200 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'250'" --measurement-type project --flex-chosen 250 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000
python ./src/execute_setting.py --tol 1 --submit-mode vanilla --model-types 'VAE-flex' --pretrained-model-dir './generative_model_collections/checkpoint/' --init-mode "previous-and-random" --grid "'784'" --measurement-type project --flex-chosen 784 --num-measurements 784 --fair-counter 1 --max-update-iter 10000 --dataset fashion-mnist --qsub-time 150000

Sparsity-based

python ./src/sparsity_mnist.py --refresh --data_mode fashion-mnist --mode wavelet
python ./src/sparsity_mnist.py --refresh --data_mode fashion-mnist

MEASUREMENTS

For the reconstruction experiments with only one stage (section 2) set --fair-counter 1
Each following command executes several experiments with different setups: --num-measurements stands for the used number of measurements, --noise-std for the applied strength of noise and --input-type for the used batch. You can, according to your needs, restrict the setup scenarios. For example, the first subsequent command could be converted into:

python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --grid "'5'" --flex-chosen 5 --num-measurements 10 --pretrained-model-dir './mnist_vae/models/' --qsub-time 50000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 --tol 1 --input-type full-input --input-seed 2019 --fair-counter 5

This executes only one experiment instead of 24.

MNIST

Separately trained, no dimension choice

python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --grid "'5'" --flex-chosen 5 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './mnist_vae/models/' --qsub-time 50000 --measurement-type

gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --input-type full-input random-test --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --grid "'10'" --flex-chosen 10 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './mnist_vae/models/' --qsub-time 50000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --input-type full-input random-test --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --grid "'20'" --flex-chosen 20 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './mnist_vae/models/' --qsub-time 50000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --input-type full-input random-test --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --grid "'60'" --flex-chosen 60 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './mnist_vae/models/' --qsub-time 50000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --input-type random-test full-input --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --grid "'125'" --flex-chosen 125 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './mnist_vae/models/' --qsub-time 50000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --input-type random-test full-input --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --grid "'400'" --flex-chosen 400 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './mnist_vae/models/' --qsub-time 50000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --input-type random-test full-input --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --grid "'784'" --flex-chosen 784 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './mnist_vae/models/' --qsub-time 50000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --input-type random-test full-input --input-seed 2019 --fair-counter 5

Separately trained, but dimension choice
python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex-alt' --init-mode "previous-and-random" --n-z -1 --num-measurements 10 25 50 100 200 750 --n-z -1 --pretrained-model-dir './mnist_vae_flex/models/' --grid "'5 10 15 20 40 60 80 100 784'" --qsub-time 50000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tolerance-checking non-squared --strict-checking strict --eps 7.84 --input-type full-input random-test --input-seed 2019
Jointly trained and dimension choice
python ./src/execute_setting.py --submit-mode vanilla --model-types 'vae-flex' --init-mode "previous-and-random" --n-z -1 --num-measurements 10 25 50 100 200 750 --n-z -1 --pretrained-model-dir './mnist_vae_flex/models/mnist-vae-flex-5-10-15-20-40-60-80-100' --grid "'5 10 15 20 40 60 80 100'" --qsub-time 200000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --strict-checking strict --tolerance-checking non-squared --eps 7.84 --input-type full-input random-test --input-seed 2019

Sparsity-based Lasso
python ./src/execute_setting.py --submit-mode vanilla --model-types lasso --init-mode "previous-and-random" --num-measurements 10 25 50 100 200 300 400 500 600 750 --n-z -1 --tv-or-lasso-mode sklearn --reproducible reproducible --measurement-type gaussian --

noise-std 0.0 0.5 --lmbd 0.1 --dataset mnist --input-type full-input random-test --input-seed 2019

Sparsity-based TV

python ./src/execute_setting.py --submit-mode vanilla --model-types tv-norm --init-mode "previous-and-random" --num-measurements 10 25 50 100 200 300 400 500 600 750 --n-z -1 --tv-or-lasso-mode cvxpy-constrEq-reweight1 --reproducible reproducible --measurement-type gaussian --noise-std 0.0 --dataset mnist --input-type full-input random-test --input-seed 2019

python ./src/execute_setting.py --submit-mode vanilla --model-types tv-norm --init-mode "previous-and-random" --num-measurements 10 25 50 100 200 300 400 500 600 750 --n-z -1 --tv-or-lasso-mode cvxpy-constrInEq-alpha10-reweight1 --reproducible reproducible --measurement-type gaussian --noise-std 0.5 --dataset mnist --input-type random-test --input-seed 2019

Sparsity-based Wavelet

python ./src/execute_setting.py --submit-mode vanilla --model-types lasso-wavelet --init-mode "previous-and-random" --num-measurements 10 25 50 100 200 300 400 500 600 750 --n-z -1 --tv-or-lasso-mode cvxpy-constrEq-reweight1-synthesis-nonredundant-28 --reproducible reproducible --measurement-type gaussian --wavelet-type 'db1selected' 'db1' 'db2' 'db3' --noise-std 0.0 --dataset mnist

Fashion

Separately trained, no dimension choice

python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'5'" --flex-chosen 5 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5

python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'10'" --flex-chosen 10 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5

python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'20'" --flex-chosen 20 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5

python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'40'" --flex-chosen 40 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5

python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'60'" --flex-chosen 60 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset

fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'100"' --flex-chosen 100 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'200"' --flex-chosen 200 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'250"' --flex-chosen 250 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5
python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-fixed' --init-mode "previous-and-random" --grid "'784"' --flex-chosen 784 --num-measurements 10 25 50 100 200 750 --pretrained-model-dir './generative_model_collections/checkpoint/' --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --tol 1 --dataset fashion-mnist --input-type full-input random-test --qsub-time 100000 --input-seed 2019 --fair-counter 5

Separately trained, but dimension choice
python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-flex-alt' --init-mode "previous-and-random" --n-z -1 --num-measurements 10 25 50 100 200 750 --n-z -1 --pretrained-model-dir './generative_model_collections/checkpoint/' --grid "'5 10 20 40 60 100 200 250 784"' --qsub-time 150000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --dataset fashion-mnist --tolerance-checking 'non-squared' --strict-checking strict --eps 15.68 --input-type full-input random-test --input-seed 2019

Jointly trained and dimension choice
python ./src/execute_setting.py --submit-mode vanilla --model-types 'VAE-flex' --init-mode "previous-and-random" --n-z -1 --num-measurements 10 25 50 100 200 750 --n-z -1 --pretrained-model-dir './generative_model_collections/checkpoint/' --grid "'5 10 20 40 60 100 200 250"' --qsub-time 150000 --measurement-type gaussian --reproducible reproducible --noise-std 0.0 0.5 --dataset fashion-mnist --tolerance-checking 'non-squared' --strict-checking strict --eps 15.68 --input-type full-input random-test --input-seed 2019

Sparsity-based Lasso
python ./src/execute_setting.py --submit-mode vanilla --model-types lasso --init-mode "previous-and-random" --num-measurements 10 25 50 100 200 300 400 500 600 750 --n-z -1 --tv-or-lasso-mode sklearn --reproducible reproducible --measurement-type gaussian --noise-std 0.0 0.5 --lmbd 0.1 --dataset fashion-mnist --input-type full-input random-test --input-seed 2019

Sparsity-based TV

python ./src/execute_setting.py --submit-mode vanilla --model-types tv-norm --init-mode "previous-and-random" --num-measurements 10 25 50 100 200 300 400 500 600 750 --n-z -1 --tv-or-lasso-mode cvxpy-constrEq-reweight1 --reproducible reproducible --measurement-type gaussian --noise-std 0.0 --dataset fashion-mnist --input-type full-input random-test --input-seed 2019
python ./src/execute_setting.py --submit-mode vanilla --model-types tv-norm --init-mode "previous-and-random" --num-measurements 10 25 50 100 200 300 400 500 600 750 --n-z -1 --tv-or-lasso-mode cvxpy-constrInEq-alpha10-reweight1 --reproducible reproducible --measurement-type gaussian --noise-std 0.5 --dataset fashion-mnist --input-type random-test --input-seed 2019 --emd-bol False --class-bol False

Sparsity-based Wavelet
python ./src/execute_setting.py --submit-mode vanilla --model-types lasso-wavelet --init-mode "previous-and-random" --num-measurements 10 25 50 100 200 300 400 500 600 750 --n-z -1 --tv-or-lasso-mode cvxpy-constrEq-reweight1-synthesis-nonredundant-28 --reproducible reproducible --measurement-type gaussian --wavelet-type 'db1selected' 'db1' 'db2' 'db3' ‘db4’ ‘db5’ --noise-std 0.0 0.5 --dataset fashion-mnist --input-type full-input random-test --input-seed 2019

If issues with classifier or emd based metrics (e.g. segmentation faults), turn them off via --class-bol False or --emd-bol False. Alternatively, simply rerun the experiments.