Contents


```
clear; close all; clc
addpath(genpath('../../src'))
sd = 2; rng(sd);

% define target
pi = Banana();
d = 2;
```

Build map adaptively

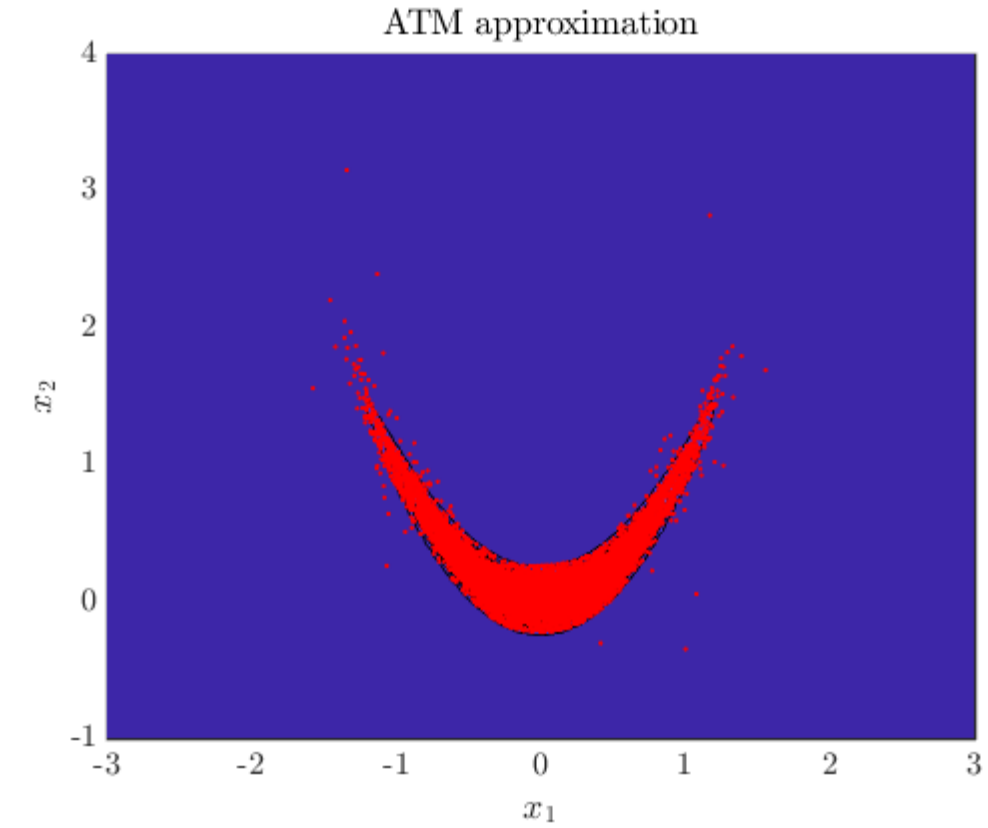
```
% set max_terms
max_terms = 40;

% define reference and samples
N = 2000;
Ztrain = randn(N,d);
Zvalid = randn(N,d);

% define total-order identity map using Hermite functions
basis = ProbabilistHermiteFunction();
T = identity_map(1:d, basis);
T = TriangularTransportMap(T);

% define and optimize pullback-density
[Topt, output] = adaptive_transport_map(T, pi, Ztrain, Zvalid, max_terms);
```

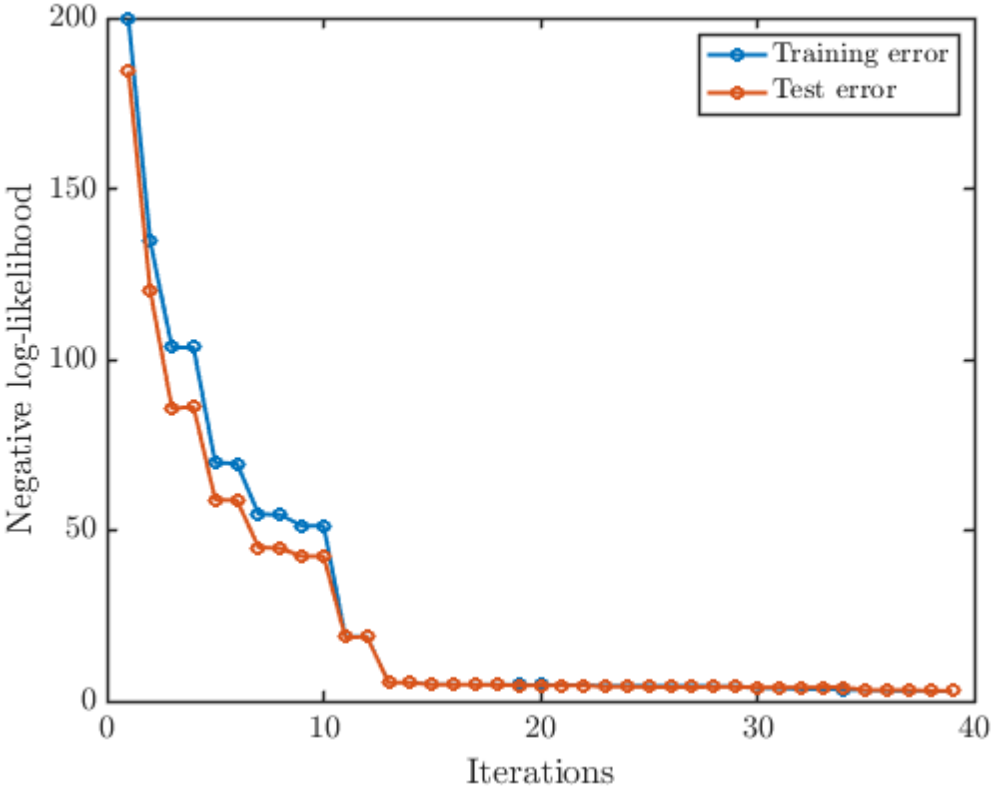
```
Term    2 - Training error: 199.6112, Validation error: 184.4407
Term    3 - Training error: 134.7613, Validation error: 120.2901
Term    4 - Training error: 103.5518, Validation error:  85.7179
Term    5 - Training error: 103.5113, Validation error:  86.0994
Term    6 - Training error:  69.7413, Validation error:  58.9712
Term    7 - Training error:  69.5695, Validation error:  58.7790
Term    8 - Training error:  54.7355, Validation error:  45.0130
Term    9 - Training error:  54.5411, Validation error:  44.7176
Term   10 - Training error:  51.3099, Validation error:  42.3905
Term   11 - Training error:  51.3087, Validation error:  42.4026
Term   12 - Training error:  18.8919, Validation error:  18.7309
Term   13 - Training error:  18.8736, Validation error:  18.7577
Term   14 - Training error:   5.4369, Validation error:   5.3777
Term   15 - Training error:   5.4316, Validation error:   5.3769
Term   16 - Training error:   4.9026, Validation error:   4.8452
Term   17 - Training error:   4.8729, Validation error:   4.8494
Term   18 - Training error:   4.8298, Validation error:   4.7757
Term   19 - Training error:   4.8164, Validation error:   4.7716
Term   20 - Training error:   4.7178, Validation error:   4.6035
Term   21 - Training error:   4.6897, Validation error:   4.6138
Term   22 - Training error:   4.6529, Validation error:   4.5732
Term   23 - Training error:   4.6523, Validation error:   4.5797
Term   24 - Training error:   4.4727, Validation error:   4.1989
Term   25 - Training error:   4.4703, Validation error:   4.2387
Term   26 - Training error:   4.3938, Validation error:   4.0967
```

```
Term   27 - Training error:   4.3815, Validation error:   4.0980
Term   28 - Training error:   4.3637, Validation error:   4.1183
Term   29 - Training error:   4.3475, Validation error:   4.1386
Term   30 - Training error:   4.3464, Validation error:   4.1372
Term   31 - Training error:   3.8383, Validation error:   4.0270
Term   32 - Training error:   3.7357, Validation error:   4.0194
Term   33 - Training error:   3.5378, Validation error:   3.9808
Term   34 - Training error:   3.5134, Validation error:   4.0830
Term   35 - Training error:   3.5083, Validation error:   4.0513
Term   36 - Training error:   3.0738, Validation error:   3.1904
Term   37 - Training error:   3.0333, Validation error:   3.1784
Term   38 - Training error:   3.0328, Validation error:   3.1943
Term   39 - Training error:   2.9538, Validation error:   3.0224
Term   40 - Training error:   2.9536, Validation error:   3.0228
```

Plot approximation

```
% sample from push-forward density
Zeval = randn(1e4,2);
X_approx = Topt.evaluate(Zeval);

% define grid
xx = linspace(-3,3,100);
yy = linspace(-1,4,100);
[X1,X2] = meshgrid(xx,yy);
logpi_true = pi.log_pdf([X1(:),X2(:)]);
logpi_true = reshape(logpi_true, size(X1,1), size(X2,2));

% plot approximation
figure
hold on
contourf(X1, X2, exp(logpi_true), 20)
plot(X_approx(:,1), X_approx(:,2), '.r','MarkerSize',2)
xlabel('$x_1$')
ylabel('$x_2$')
xlim([-3,3])
ylim([-1,4])
title('ATM approximation')
set(gca,'FontSize',16)
hold off

% plot errors vs. iteration
figure
hold on
plot(1:length(output.train_err), output.train_err, '-o')
plot(1:length(output.valid_err), output.valid_err, '-o')
xlabel('Iterations')
ylabel('Negative log-likelihood')
legend('Training error','Test error')
set(gca,'FontSize',16)
hold off

% -- END OF FILE --
```





Published with MATLAB® R2019b