Contents

Initialize variables

```
clear; clc; close all;
rng(1);
N_list = [5, 10, 20, 40, 60, 80, 100, 500, 1000, 10000];
M = 100;

alpha = 5.5;
beta = 1;
true_lambda = 5;

err_MLE = zeros(M,length(N_list));
err_Post = zeros(M,length(N_list));
```

Loop through the input

```
for iter = 1:length(N_list)
    N = N_list(iter);
    for i = 1:M
```

Draw data samples

```
        X = -(log(rand(N, 1)) * 0.2);
```

Calculate the estimate of lambda using MLE

For lambda, the MLE is derived in the report

```
        ml_estimate = N / sum(X);
```

Calculate the estimate of lambda using Posterior

For a Gamma prior, the posterior mean is derived in the report.

```
        posterior_estimate = (alpha + N)/(beta + sum(X));
```

Update errors in the matrices

```
        err1 = abs(ml_estimate - true_lambda)/true_lambda;
        err2 = abs(posterior_estimate - true_lambda)/true_lambda;
        err_MLE(i, iter) = err1;
        err_Post(i, iter) = err2;
```

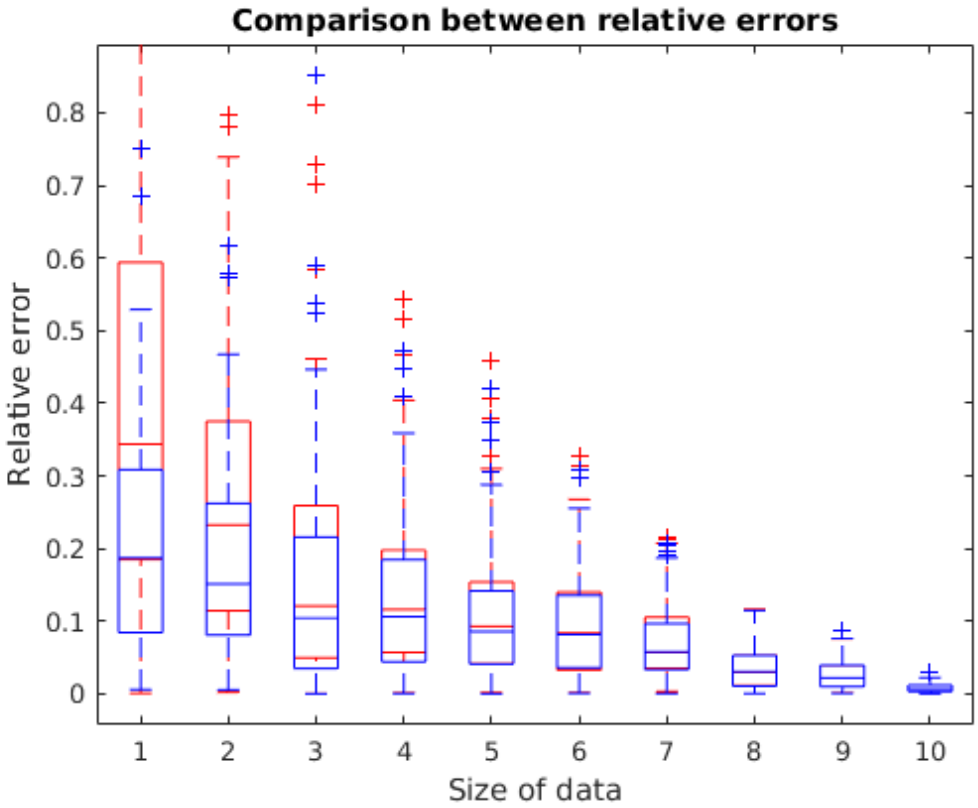
```
    end
end
```

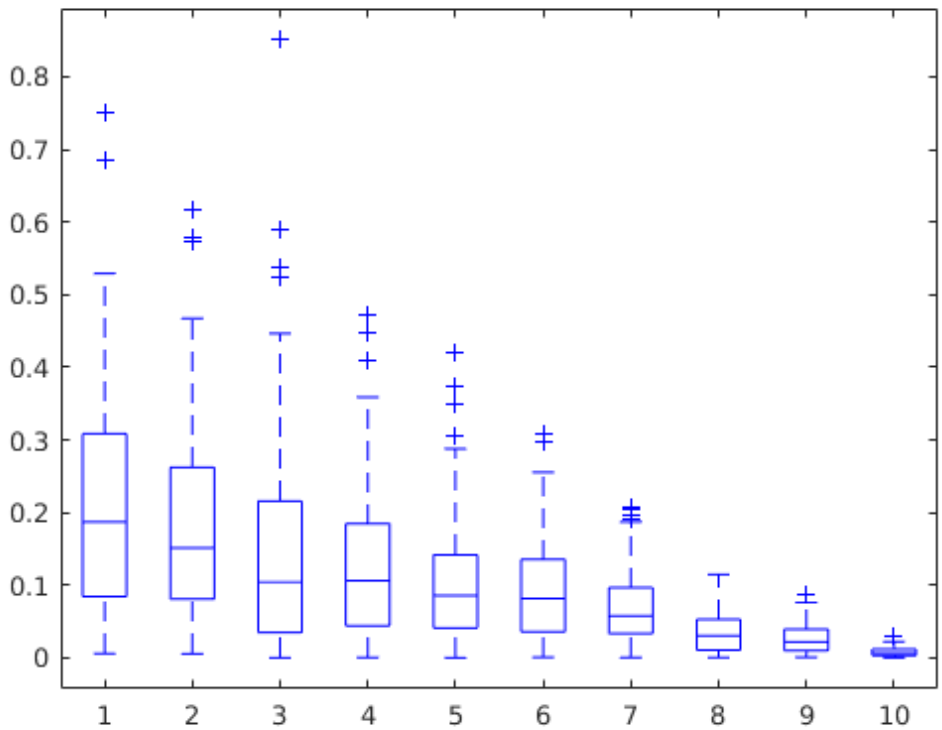
Plot the data!

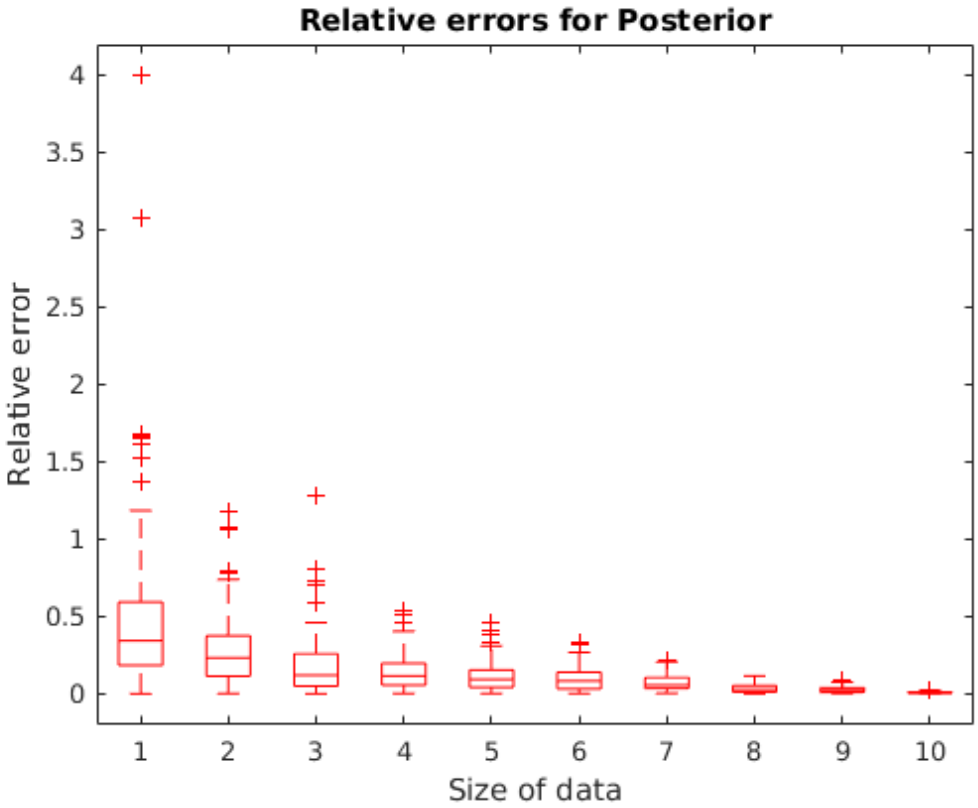
```
figure(1);
boxplot(err_MLE, 'COLOR', 'r', 'Symbol', 'r+');
hold on;
boxplot(err_Post, 'COLOR', 'b', 'Symbol', 'b+');
hold on;
xlabel('Size of data');
ylabel('Relative error');
title('Comparison between relative errors');
hold off;

figure(2);
boxplot(err_MLE, 'COLOR', 'r', 'Symbol', 'r+');
hold on;
xlabel('Size of data');
ylabel('Relative error');
title('Relative errors for MLE');
hold off;

figure(3);
boxplot(err_Post, 'COLOR', 'b', 'Symbol', 'b+');
hold on;
xlabel('Size of data');
ylabel( 'Relative error' );
title('Relative errors for Posterior');
hold off;
```


Comparison between relative errors
Relative error
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1
2
3
4
5
6
7
8
9
10
Size of data


0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
1
2
3
4
5
6
7
8
9
10



Published with MATLAB® R2015b