

maximum_likelihood_estimation

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1 Importing packages

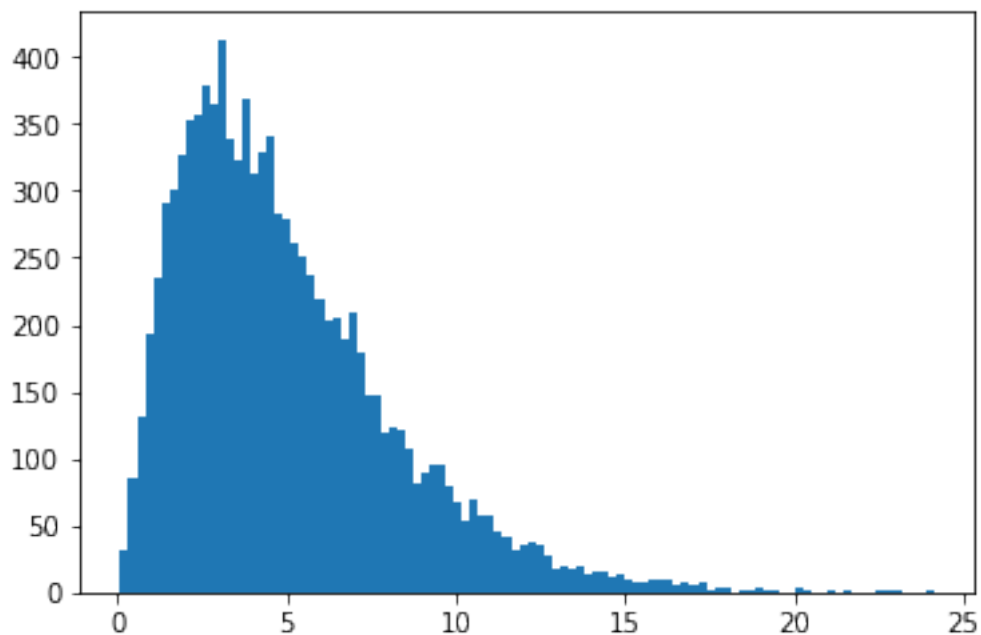
```
In [1]: import numpy as np
import matplotlib.pyplot as plt
```

2 Parameters

```
In [2]: samples = 10000
n_binomial = 10
```

3 Generating test data

```
In [3]: x = np.random.chisquare(5,samples) #some random distribution other than the below
plt.hist(x,bins = 100)
plt.show()
```



4 Estimating the parameters

```
In [4]: p_binomial = np.mean(x)/n_binomial
        x_binomial = np.random.binomial(n_binomial , p_binomial , samples)

        beta_exponential = np.mean(x)
        x_exponential = np.random.exponential(beta_exponential , samples)

        lambda_poisson = np.mean(x)
        x_poisson = np.random.poisson(lambda_poisson , samples)

        mean_guass = np.mean(x)
        variance_guass = np.mean(np.square(x - mean_guass))
        x_guassian = np.random.normal(mean_guass , variance_guass , samples)

        mu_laplacian = np.median(x)
        lambda_laplacian = np.mean(abs(x - mu_laplacian))
        x_laplace = np.random.laplace(mu_laplacian , lambda_laplacian , samples)
```

5 Plotting the histograms of the samples drawn from distributions

```
In [5]: plt.figure(figsize = (25,20))
        plt.subplot(3,2,1)
        plt.hist(x,bins = 100)
        plt.title("ground truth")

        plt.subplot(3,2,2)
        plt.hist(x_binomial,bins = 100)
        plt.title("Binomial estimation")

        plt.subplot(3,2,3)
        plt.hist(x_exponential,bins = 100)
        plt.title("Exponential estimation")

        plt.subplot(3,2,4)
        plt.hist(x_poisson,bins = 100)
        plt.title("Poisson estimation")

        plt.subplot(3,2,5)
        plt.hist(x_guassian,bins = 100)
        plt.title("Guassian estimation")

        plt.subplot(3,2,6)
        plt.hist(x_laplace,bins = 100)
        plt.title("laplacian estimation")

        plt.show()
```

