COE782- ML - Lista2 - Parte prática - E4

Estimação pdf

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In [1]:
```
#Referência
#https://stats.stackexchange.com/questions/70855/generating-random-variables-fro

import numpy as np
import matplotlib.pyplot as plt
from sklearn.neighbors import KernelDensity

%matplotlib inline
```

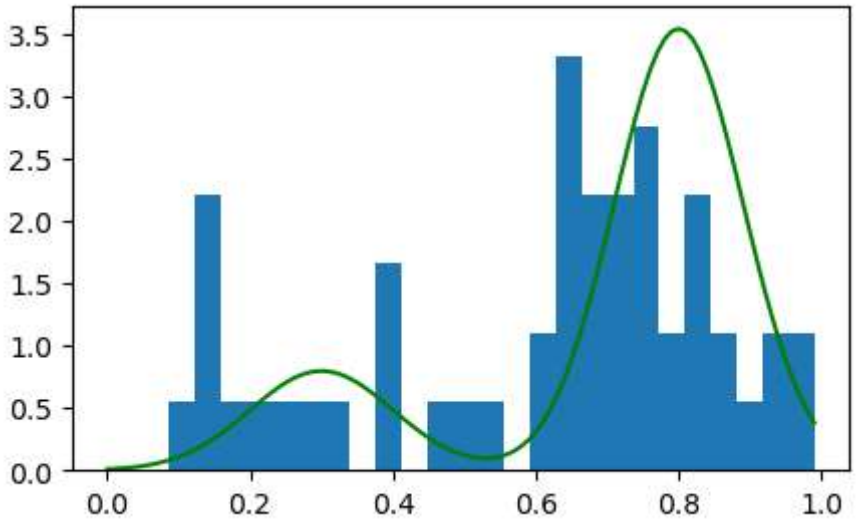
In [2]:
```
#definição parâmetros de gaussiana (mistura)
mu = [0.3, 0.8]
sigma = [0.1, 0.09]
p_i = [0.2, 0.8]
x = np.arange(0., 1.,0.01)

#definição parâmetros do histograma
n = 50
delta = [0.04, 0.08, 0.25]
ruido = [-0.1, 0.09]


#função que monta mistura de Gaussianas (eq. 2.188)
def univariate_normal(x, mean, variance):
    """pdf of the univariate normal distribution."""
    return ((1. / np.sqrt(2 * np.pi * variance)) *
            np.exp(-(x - mean)**2 / (2 * variance)))
```

In [3]:
```
#Curva mistura de Gaussianas
y = p_i[0] * univariate_normal(x, mean=mu[0], variance=sigma[0]**2) + p_i[1] * u


# amostragem de dados com ruido para o histograma
hist = []
for i in range(n):
    z_i = np.argmax(np.random.multinomial(1, p_i))
    h_i = np.random.normal(mu[z_i], sigma[z_i]) + ruido[int(np.random.default_rn
    hist.append(h_i)
```

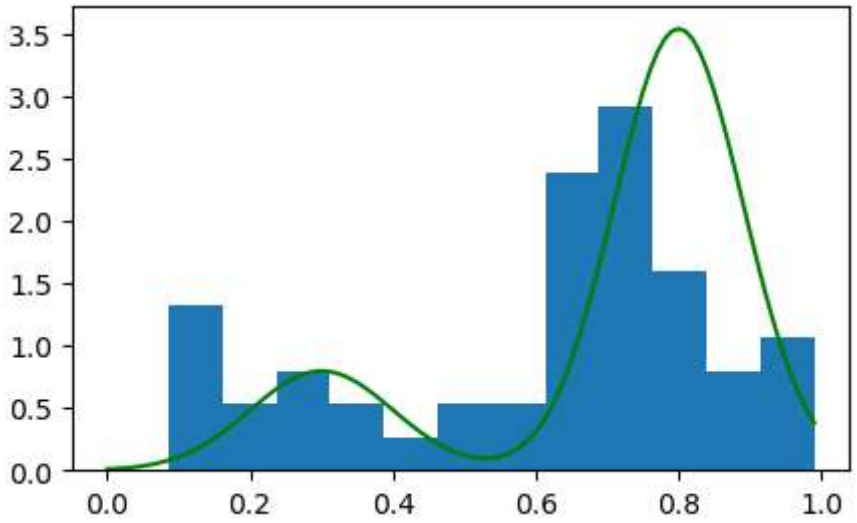
In [4]:
```
#plota resultados (figura 2.24 - Bishop)
for i in range (len(delta)):
    print('Delta = ', delta[i])
    fig, ax = plt.subplots(figsize=(5, 3))

    ax.hist(hist, bins=int(1/delta[i]), density=True)
```

```
    ax.plot(x, y, color='g',linestyle="-")
    plt.show()
```

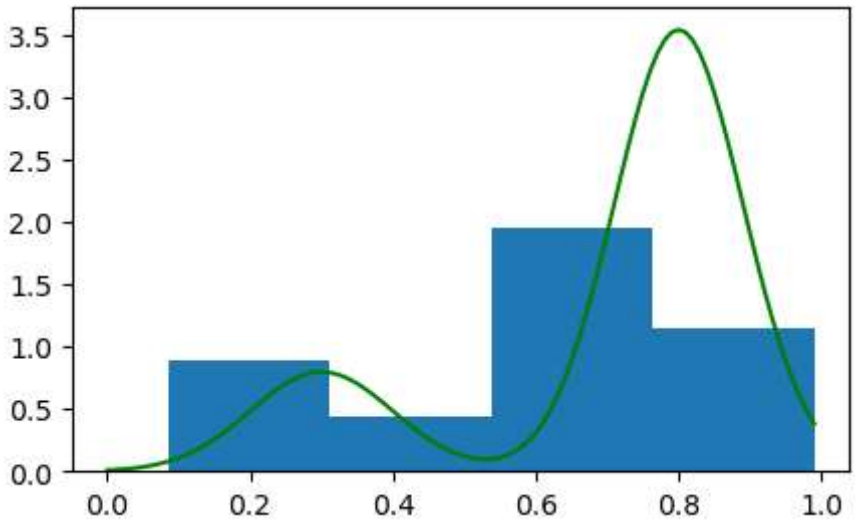
```
Delta =  0.04
```




```
Delta =  0.08
```



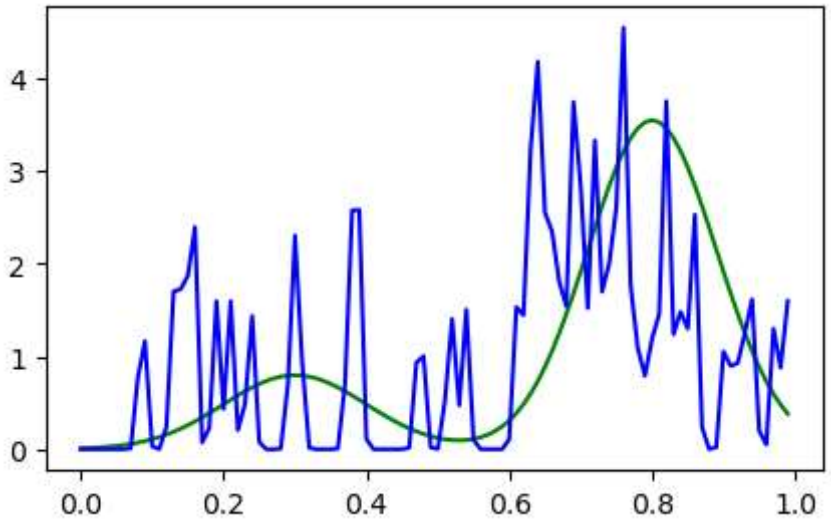

```
Delta =  0.25
```



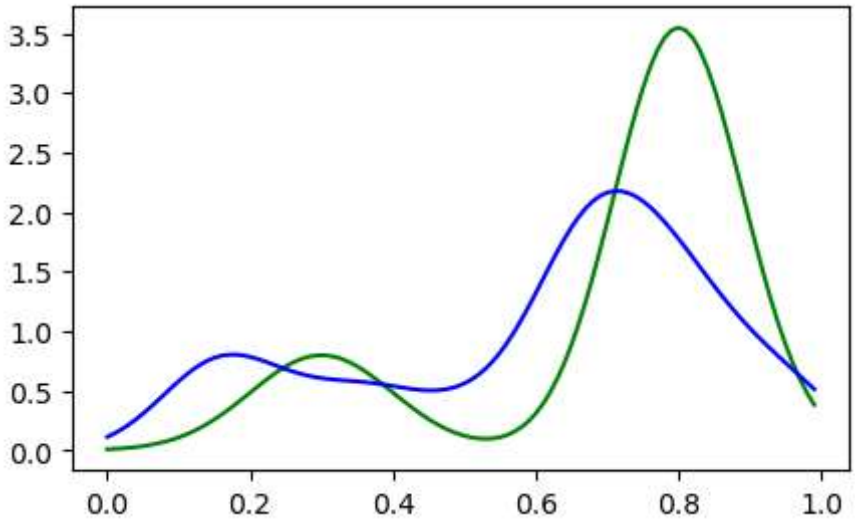
In [5]:
```
#Método Kernel
#https://scikit-learn.org/stable/auto_examples/neighbors/plot_kde_1d.html

#largura da banda
```

```
bandwidth = [0.005, 0.07, 0.2]

for i in range (len(bandwidth)):
    print('h = ', bandwidth[i])

    kde = KernelDensity(kernel="gaussian", bandwidth=bandwidth[i]).fit(np.array(
    log_dens = kde.score_samples(x.reshape(-1,1))

    #plota resultados (figura 2.25 - Bishop)
    fig, ax = plt.subplots(figsize=(5, 3))
    ax.plot(x, y, color='g',linestyle="-")
    ax.plot(x.reshape(-1,1)[:, 0], np.exp(log_dens), color='blue',linestyle="-")
    plt.show()
```

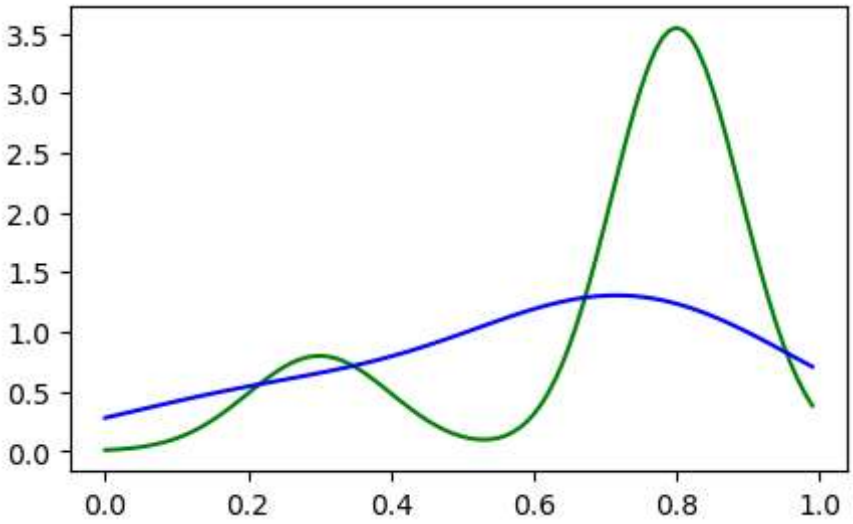
```
h =  0.005
```




```
h =  0.07
```




```
h =  0.2
```



In [ ]: