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"""
Registration : xxxx
Description  : Generating Exponential Distributed RV from Uniform RV
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"""

import numpy as np
import matplotlib.pyplot as plt

lam = 5.0
N = np.random.uniform(size=10000)
Nexp = -(1.0/lam)*np.log(N)

plt.subplot(2,1,1)
n, bins, patches = plt.hist(N, 'fd', density=True, color='sandybrown', edgecolor='teal',
label=r'$N=$'+str(N.size));
plt.legend(loc='best',prop={'size':30})
plt.grid(axis='y')
plt.xlim([min(bins), max(bins)]); plt.xlabel('x', size=30); plt.xticks(size=20)
plt.ylabel('$P_{Uniform}(x)$', size=30); plt.yticks(size=20)

plt.subplot(2,1,2)
n, bins, patches = plt.hist(Nexp, 'fd', density=True, color='mediumvioletred',
edgecolor='pink', label=r'$N=$'+str(N.size));
plt.plot(bins, lam*np.exp(-bins*lam), linewidth=2, color='k', label=r'$P(x) = \lambda e^{-\lambda x}$')
plt.legend(loc='best',prop={'size':30})
plt.text(1.5, 2.5, r'$\lambda=5$', size=30, color='blue')
plt.grid(axis='y')
plt.xlim([min(bins), max(bins)]); plt.xlabel('x', size=30); plt.xticks(size=20)
plt.ylabel('$P_{Exp}(x)$', size=30); plt.yticks(size=20)

plt.suptitle("Uniform to Exponential Distribution Using Transformation", size=30,
color="darkturquoise")

plt.show()
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