# -\*- coding: utf-8 -\*-

# calculate normal distribution, different sigma, ? percent

# 計算sigma

# wiki參考<https://en.wikipedia.org/wiki/68%E2%80%9395%E2%80%9399.7_rule>

import numpy as np

mu = 0

sigma = 1

dataNumbers = 50001

middle\_number = (dataNumbers + 1) / 2

X = np.linspace(-10, 10, dataNumbers, dtype=np.float64)

p\_x = 1/(((2\*np.pi)\*\*0.5)\*sigma)\*np.exp(-((X-mu)\*\*2)/(2\*sigma\*\*2))

proportion = np.sum(p\_x) # all area is 1

# test eight sigmas

sigma\_index = np.linspace(1, 16, 16)/2

for i in range(sigma\_index.shape[0]):

index\_l = np.where(X==-sigma\*sigma\_index[i])[0][0]

index\_r = np.where(X==sigma\*sigma\_index[i])[0][0]

area = np.sum(np.abs(p\_x[index\_l:index\_r])) / proportion

print(sigma\_index[i], '\u03c3:', area)

0.5 σ: 0.3829249178538218

1.0 σ: 0.6826894856845332

1.5 σ: 0.8663855922815801

2.0 σ: 0.9544997332241233

2.5 σ: 0.9875806681798945

3.0 σ: 0.9973002035821918

3.5 σ: 0.9995347417604785

4.0 σ: 0.9999366575020587

4.5 σ: 0.9999932046518325

5.0 σ: 0.999999426696658

5.5 σ: 0.9999999620208593

6.0 σ: 0.9999999980268238

6.5 σ: 0.9999999999196798

7.0 σ: 0.9999999999974405

7.5 σ: 0.9999999999999362

8.0 σ: 0.9999999999999988