import numpy as np

import scipy.stats as sts

import matplotlib.pyplot as plt

# Grid of possible true baby body temperatures (in Celsius)

mu = np.linspace(36, 39, 300)

# Prior: Healthy baby's temperature ~ N(37, 0.2)

prior = sts.norm.pdf(mu, loc=37, scale=0.2)

prior = prior / prior.sum() # Normalize

# Likelihood: Observed baby temperature = 38.0°C

def likelihood\_func(observation, mu\_values):

likelihood = sts.norm.pdf(observation, loc=mu\_values, scale=0.3)

return likelihood / likelihood.sum()

likelihood = likelihood\_func(38.0, mu)

# Posterior (unnormalized)

unnormalized\_posterior = prior \* likelihood

posterior = unnormalized\_posterior / unnormalized\_posterior.sum() # Normalize

# Sample from the posterior

samples = np.random.choice(mu, size=10000, p=posterior)

# Plot histogram of posterior samples

plt.hist(samples, bins=30, density=True, alpha=0.7, color='skyblue', edgecolor='black')

plt.xlabel("Baby's Body Temperature (°C)")

plt.ylabel("Density")

plt.title("Histogram of Posterior Samples")

plt.show()





