import numpy as np import

matplotlib.pyplot as plt

import seaborn as sns from

hmmlearn import hmm

# Define the state space

states = ["Silence", "Word1", "Word2", "Word3"] n\_states

= len(states)

# Define the observation space observations

= ["Loud", "Soft"] n\_observations =

len(observations)

# Define the initial state distribution start\_probability

= np.array([0.8, 0.1, 0.1, 0.0])

# Define the state transition probabilities transition\_probability

= np.array([[0.7, 0.2, 0.1, 0.0],

[0.0, 0.6, 0.4, 0.0],

[0.0, 0.0, 0.6, 0.4],

[0.0, 0.0, 0.0, 1.0]])

# Define the observation likelihoods emission\_probability

= np.array([[0.7, 0.3],

[0.4, 0.6],

[0.6, 0.4],

[0.3, 0.7]])

# Fit the model

model = hmm.CategoricalHMM(n\_components=n\_states)

model.startprob\_ = start\_probability model.transmat\_ =

transition\_probability model.emissionprob\_ =

emission\_probability

# Define the sequence of observations

observations\_sequence = np.array([0, 1, 0, 0, 1, 1, 0, 1]).reshape(-1, 1)

# Predict the most likely hidden states

hidden\_states = model.predict(observations\_sequence) print("Most

likely hidden states:", hidden\_states)

# Plot the results sns.set\_style("darkgrid")

plt.plot(hidden\_states, '-o', label="Hidden State")

plt.legend() plt.show()