**ML EXPERIMENT 8**

import numpy as np

# Initialize the probabilities

p\_heads = [0.6, 0.5]  # initial guess

rounds = ["HTTTHHTHTH", "HTHTTTHHTT", "THHHTHHHTH", "HHHHTHHHHH", "HTHHHHHTHH"]

# EM algorithm

for iteration in range(10):  # number of iterations

    heads = [0, 0]

    tails = [0, 0]

    expectation\_heads = [0, 0]

    expectation\_tails = [0, 0]

    for round in rounds:

        len\_round = len(round)

        num\_heads = round.count('H')

        num\_tails = len\_round - num\_heads

        # E step

        weight\_0 = p\_heads[0]\*\*num\_heads \* (1-p\_heads[0])\*\*num\_tails

        weight\_1 = p\_heads[1]\*\*num\_heads \* (1-p\_heads[1])\*\*num\_tails

        sum\_weights = weight\_0 + weight\_1

        weights = [weight\_0/sum\_weights, weight\_1/sum\_weights]

        # Accumulate expectations

        for i in range(2):

            expectation\_heads[i] += weights[i] \* num\_heads

            expectation\_tails[i] += weights[i] \* num\_tails

    # M step

    for i in range(2):

        p\_heads[i] = expectation\_heads[i] / (expectation\_heads[i] + expectation\_tails[i])

    print(f"After iteration {iteration+1}, estimated probabilities of heads are {p\_heads}")

