Algorithm 1: The training process of Preferential Labeling

Data: D: the training dataset; E the maximum training epochs; K the sampling times; GNN the GNN model

```
epoch = 0
while epoch < E do
    epoch += 1
    for each batch B ∈ D do
        dataList = []
        for each graph G and its ground truth Y in B do
            lowestLoss = inf
            candidateG = None
            i = 0
            while i < K do
                i += 1
                // randomly permute G
                PG = randomPermute(G)
                // feed the permuted graph to GNN and compute the loss
                y = GNN(PG)
                loss = computeLoss(y, Y)
                if loss < lowestLoss then
                    lowestLoss = loss
                    candidateG = PG
                end
            end
            // select the permutation that has the lowest loss
            data = (candidateG, Y)
            dataList.append(data)
        end
        // use the permutation that has the lowest loss to optimize GNN
        GNN.optimize(dataList)
    end
end
```