|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm 1** | | | | | | |
|  | **Input**: Training data T = (**A,X,Y**), pre\_defined condensed lablels **Y’** | | | | | |
|  | Initialize X’ as node features randomly seclected from each class | | | | | |
|  | **for** k = 0.....K-1 do // K次生成模型的更新 | | | | | |
|  |  | | Initialize θ0 = θ //随机初始化模型参数 | | | |
|  |  | **for** t = 0,.....,T-1 do // T次GNN模型更新 | | | | |
|  |  |  | | D’ = 0 // 初始化匹配损失 | | |
|  |  |  | | {T} = { T1,T2,....,Tc } // 构建C个元任务 | | |
|  |  |  | | **for** c = 0,....,C-1 do //在每个元任务中进行训练 | | |
|  |  |  | |  | Compute **A’** = gλ(**X’**); then S = {**A’,X’,Y’**} | |
|  |  |  | |  | Sample (**Asc , Xsc , Ysc**) ~ T and (**As’c , Xs’c , Ys’c**) ~ S //在两个数据集中分别采样支持集 | |
|  |  |  | |  | Sample (**Aqc , Xqc , Yqc**) ~ T and (**Aq’c , Xq’c , Yq’c**) ~ S //在两个数据集中分别采样查询集 | |
|  |  |  | |  | θ0 = θ | |
|  |  |  | |  | **for** j = 0,....,J-1 do | |
|  |  |  | |  |  | **H**support **←** GNNθj(**Asc , Xsc , Ysc**) and **H’**support **←** GNNθj(**A’sc , X’sc ,Y’sc**) // 计算质心嵌入 |
|  |  |  | |  |  | **C =**  and **C’ =**  // 计算两个数据集的支持原型 |
|  |  |  | |  |  | **P =**  and **P’ =** // 通过每个类的支持原型和质心嵌入之间的欧几里德距离计算类分布向量 |
|  |  |  | |  |  | **L**support **= L(P, Ys’c) ； L’**support **= L(P’, Ys’c)** |
|  |  |  | |  |  | θj+1 = θj-1 - α∇**L’**support // 内循环更新 |
|  |  |  | |  |  | **H**query **←** GNNθj+1(**Aqc , Xqc , Yqc**) and **H’**query **←** GNNθj+1(**A’qc , X’qc ,Y’qc**) // 计算质心嵌入 |
|  |  |  | |  |  | **P =**  and **P’ =** // 通过每个类的支持原型和质心嵌入之间的欧几里德距离计算类分布向量 |
|  |  |  | |  |  | **Lcj**query **← L(P, Yq’c)** and **Lcj’**query **← L(P’, Yq’c)** |
|  |  |  | |  | **end** | |
|  |  |  | |  | **D’ ← D’ + D(**∇θj+1**Lcj**query , ∇θj+1**Lcj’**query **）** // 用后一次内循环获得的查询集损失计算梯度匹配损失 | |
|  |  |  | |  | **Update X’ ← X’ -** µ1∇x’**D’ and** λ **←** λ **-** µ2∇λ**D’** | |
|  |  |  | | **end** | | |
|  |  |  | | // 记录每个任务最后一步的更新情况并用于更新GNN参数 | | |
|  |  | **end** | | | | |
|  | **end** | | | | | |
|  | **A’** = gλ(**X’**) | | | | | |
|  | **A’**ij = **A’**ij if **A’**ij > ℇ,otherwise 0 | | | | | |
| 1. Return( **A’,X’,Y’** ) | | | | | | |