Supplementary Material: Trusted Loss Correction for Noisy Multi-Label Learning

Amirmasoud Ghiassi* S.GHIASSI@TUDELFT.NL
Delft University of Technology, Delft, Netherlands

Cosmin Octavian Pene* PENE.COSMIN.OCTAVIAN@GMAIL.COM
Delft University of Technology, Delft, Netherlands

Robert Birke ROBERT.BIRKE@UNITO.IT
Computer Science dept., University of Turin, Turin, Italy

Lydia Y.Chen LYDIAYCHEN@IEEE.ORG
Delft University of Technology, Delft, Netherlands

Editors: Emtiyaz Khan and Mehmet Gönen

TLCM

Algorithm 1 depicts our TLCM algorithm.

Algorithm 1: TLCM

Input : Multi-label corruption matrix $\widehat{\boldsymbol{C}}$ (Algorithm 2), Untrained classifier g, Noisy data $\mathcal{S}$, trusted multi-label data $\mathcal{G}$, Number of epochs E_{max}
Output: Trained robust classifier g
for $e = 1, ..., E_{max}$ **do**
  for $(\boldsymbol{x}, \boldsymbol{y}) \in \mathcal{G}$ **do**
    Train $g(\cdot; \phi)$ with $\ell = \mathcal{L}_{ASL}(\sigma(g(\boldsymbol{x})), \boldsymbol{y})$
  end
  for $(\boldsymbol{x}, \hat{\boldsymbol{y}}) \in \mathcal{S}$ **do**
    Train $g(\cdot; \phi)$ with $\ell = \mathcal{L}_{ASL}(\widehat{\boldsymbol{C}}^T \sigma(g(\boldsymbol{x})), \hat{\boldsymbol{y}})$
  end
end

Noise Corruption Matrix Estimation

Algorithm 2 depicts our novel noise corruption matrix estimation method.

*. These authors contributed equally to this work

Algorithm 2: TLCM $\widehat{C}$ estimation

Input : Noisy data $\mathcal{S}$, trusted single-label data $\mathcal{G}_S$, silver classifier f, Number of epoch E_{max}

Output: Estimated $\widehat{C}$

for $e = 1, ..., E_{max}$ **do**
  for $(\boldsymbol{x}, \hat{\boldsymbol{y}}) \in \mathcal{S}$ **do**
    Train $f(\cdot; \theta)$ with $\ell = \mathcal{L}_{ASL}(f(\boldsymbol{x}), \hat{\boldsymbol{y}})$
  end
end

`/* Single-label noise matrix */`

Fill $\widetilde{C} \in \mathbb{R}^{K \times K}$ with zeros

for $k = 1, ..., K$ **do**
  $N_k = 0$
  for $(\boldsymbol{x}, \boldsymbol{y}) \in \mathcal{G}_S, y_k = 1$ **do**
    N_k += 1
    $\widetilde{C}_{k\cdot}$ += $f_{soft}(\boldsymbol{x})$
  end
  $\widetilde{C}_{k\cdot} = \frac{1}{N_k} \widetilde{C}_{k\cdot}$
end

`/* Multi-label noise matrix */`

Fill $\widehat{C} \in \mathbb{R}^{K \times K}$ with zeros

for $k = 1, ..., K$ **do**
  $N_k = 0$
  for $(\boldsymbol{x}, \boldsymbol{y}) \in \mathcal{G}$, $y_k = 1$ **do**
    N_k += 1
    Fill $\boldsymbol{r} \in \mathbb{R}^K$ with zeros
    for $l = 1, ..., K$, $l \neq k, y_l = 1$ **do**
      $\boldsymbol{r}$ += $\widetilde{C}_{k\cdot} - \widetilde{C}_{l\cdot}$
    end
    $\widehat{C}_{k\cdot}$ += $\sigma(f(\boldsymbol{x})) + \boldsymbol{r}$
  end
  $\widehat{C}_{k\cdot} = \frac{1}{N_k} \widehat{C}_{k\cdot}$
end