# Cross-Domain Product Representation Learning for Rich-Content E-Commerce

## 1. Ablation Study

In this section, we conduct additional ablation experiment to verify whether the unified product representations can be obtained with only classification loss.

The cross-domain retrieval tasks are shown on Table 1, and the intra-domain retrieval results are shown on Table 2. It can be seen that the model trained with classification loss only could obtain good performance in the intra-domain setting, but the performance is quite low in the cross-domain setting. Without the cross-domain contrastive loss, the representations in each domain are not requested to be unified in the same feature space.

## 2. Visualization Results

In Figure 1, Figure 2 and Figure 3, we give more visual samples and retrieval results of our ROPE dataset.

| tasks | loss | R@1 | R@5 | R@10 | R@20 | R@50 |
|-------|------|------|------|------|------|------|
| P2V | w/o $\mathcal{L}_{cd}$ | 3.77 | 10.05 | 15.97 | 23.83 | 37.19 |
|     | w $\mathcal{L}_{cd}$ | 82.58 | 94.88 | 97.54 | 98.89 | 99.65 |
| V2P | w/o $\mathcal{L}_{cd}$ | 4.31 | 9.09 | 13.19 | 18.12 | 27.87 |
|     | w $\mathcal{L}_{cd}$ | 65.20 | 76.56 | 82.04 | 86.86 | 91.69 |
| P2L | w/o $\mathcal{L}_{cd}$ | 4.16 | 10.06 | 14.61 | 20.92 | 31.91 |
|     | w $\mathcal{L}_{cd}$ | 54.06 | 71.07 | 77.14 | 82.86 | 89.70 |
| L2P | w/o $\mathcal{L}_{cd}$ | 3.66 | 8.58 | 12.49 | 18.76 | 29.36 |
|     | w $\mathcal{L}_{cd}$ | 42.33 | 56.48 | 63.67 | 71.11 | 80.22 |
| V2L | w/o $\mathcal{L}_{cd}$ | 32.54 | 49.56 | 57.46 | 65.34 | 75.45 |
|     | w $\mathcal{L}_{cd}$ | 45.95 | 63.63 | 70.64 | 77.50 | 85.47 |
| L2V | w/o $\mathcal{L}_{cd}$ | 33.99 | 53.85 | 63.21 | 71.81 | 81.13 |
|     | w $\mathcal{L}_{cd}$ | 48.28 | 67.20 | 74.70 | 81.52 | 89.15 |

Table 1. Retrieval results with/without cross domain loss

| tasks | R@1 | R@5 | R@10 | R@20 | R@50 |
|-------|------|------|------|------|------|
| P2P | 90.81 | 95.67 | 97.31 | 98.34 | 99.18 |
| V2V | 65.21 | 81.01 | 86.30 | 90.15 | 93.98 |
| L2L | 80.27 | 89.97 | 92.54 | 94.44 | 96.07 |

Table 2. Retrieval results with only classification loss on intra-domain tasks.
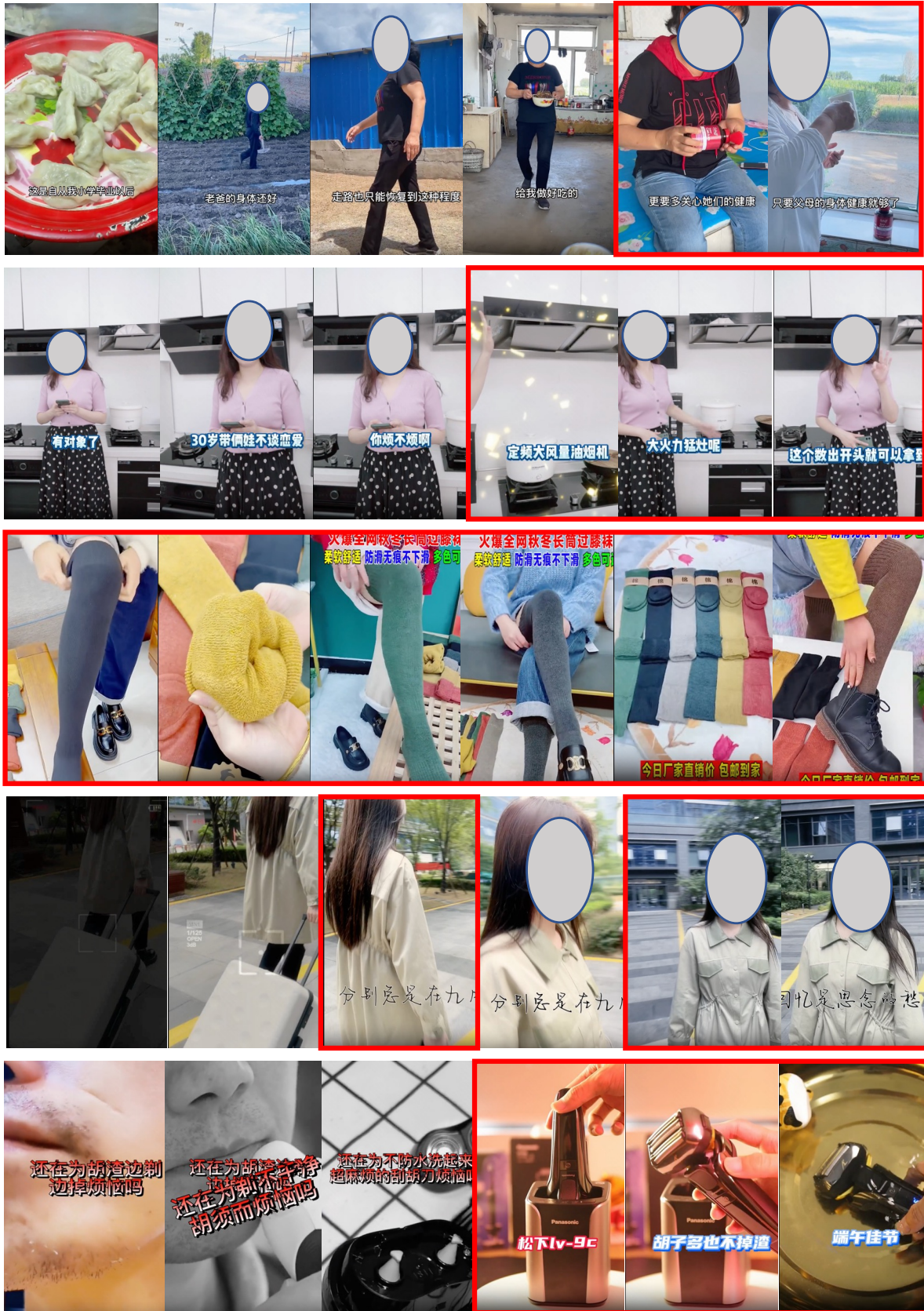
Figure 1. Product page samples.

Figure 2. Short video samples. Frames with products are marked with red boxes.

Figure 3. Live streaming samples.