Recurrent Deep Attention Network for Person Re-identification

Changhao Wang¹, Jun Zhou², Xianfei Duan², Guanwen Zhang¹*, Wei Zhou¹
1 School of Electronics and Information, Northwestern Polytechnical University, Xi’an, China
2 CNPC logging Co., Ltd, China

I. Introduction

- Person re-identification
- Attention selection
- Reinforcement learning
- Triplet-based reward

We propose a Recurrent Deep Attention Network (RDAN) that embeds convolutional architecture in a recurrent attention model and is able to select attention progressively.

II. The Proposed RDAN

At the initial step, baseline module transfers the input image I into a convolutional feature map M, and outputs the global feature vector f. The locator then takes f as input to select initial location where the glimpse network focuses on at the beginning.

During recurrent step, glimpse network extracts a glimpse around location l, on M and produces the representation g, of glimpse. The core network wraps g, and h,−1 as inputs to output current hidden state h, . Action network predicts identity of I and selects next location l based on h, .

During deploying stage for person re-id, we refer to the hidden state h, of core network at the last time step to indicate the identity of individual (i.e. final feature vector). Optimized by supervised learning

\[ L_{td} = - \sum_{t=1}^{T} \sum_{i=1}^{N} 1\{t = y\} \log p_{i}^{t} \]

\[ L_{trl} = \sum_{i=1}^{T} \max(0, (d_{t}^{\alpha} - d_{t}^{\alpha} + \alpha), 0) \]

\[ J(\theta) = \mathbb{E}_{\pi}\{R_{trl}\} = \mathbb{E}_{\pi}\{\sum_{t=1}^{T} r^{\alpha}\} \]

\[ r^{\alpha} = (d_{t}^{\alpha} - d_{t}^{\alpha}) - (d_{t-1}^{\alpha} - d_{t-1}^{\alpha}) \]

Where:

\[ d_{t}^{\alpha} = \|h_{t}^{\alpha} - h_{t}^{\alpha}\|_2, d_{t}^{\alpha} = \|h_{t}^{\alpha} - h_{t}^{\alpha}\|_2 \]

III. Experiments

We connect the location produced by the proposed model to visualize the attention selection process, as shown in right figure.