Attribute-Guided Pedestrian Retrieval: Bridging Person Re-ID with Internal Attribute Variability

Supplementary Material

7. Attribute Grouping Details

In our study, we utilize 86 annotated attributes, which are systematically categorized into six distinct groups, as delineated in Tab. 1. To provide a comprehensive understanding, we have meticulously listed each attribute and corresponding group information in Tab. 5. This categorization not only aids in organizing the attributes for more effective analysis but also plays a crucial role in our proposed Attribute-Guided Transformer-based Pedestrian Retrieval (ATPR) framework, ensuring a structured approach to attribute analysis and retrieval.

8. Effective Retrieval with Inaccurate Witness Descriptions: The Strength of ATPR

In our experimental setup, we assume that the attribute information provided for the query is accurate, meaning that the gallery contains images of the query subject with the specified attribute changes. In other words, all attributes provided by witnesses are considered accurate. Imagine a scenario where multiple witnesses provide descriptions of a suspect involved in a crime. Each witness offers different attributes as follows:

- Witness 1 recalls the suspect wearing a green jacket.
- Witness 2 mentions a red scarf.
- Witness 3 describes the suspect as having a tattoo on the left arm.

In such a case, how our AGPR method works:

Aggregating Multiple Witness Reports: Our system can process each of these attributes separately and generate different lists of potential matches according each witness's descriptions. If one of the witnesses provided accurate attribute information, our system increases the likelihood of correctly identifying the suspect. For example, if the green jacket is an accurate detail, suspects with green jackets would rank higher in the retrieval results.

Handling Inaccurate Attributes: In instances where some attributes are entirely inaccurate (e.g., there's no individual in the gallery matching the red scarf attribute with the correct ID), our system still provides a similarity ranking based on the given attribute. While this may not lead directly to the suspect, it offers valuable insights and potential leads by showing individuals who match certain parts of the witness descriptions.

Cross-referencing and Narrowing Down Candidates: By comparing and cross-referencing the results from each attribute query, investigators can narrow down potential suspects. Even if some attributes are incorrect, the overlap in retrieval results (like individuals appearing in both the green jacket and tattoo lists) can guide investigators towards more likely suspects from the similarity ranking list.

In summary, our ATPR approach is able to accommodate the uncertainty of real-world scenarios, where witness accounts may vary in accuracy. It leverages the power of attribute-guided retrieval to offer a versatile tool in the search for individuals, providing multiple angles of investigation and aiding in the accurate identification of suspects.

9. Focus and Scope

While our ATPR approach is theoretically capable of performing attribute recognition tasks, it is primarily designed and optimized for enhancing pedestrian retrieval with attribute guidance. Consequently, our focus in this work has been on leveraging attributes to refine the identification and retrieval of individuals, rather than explicitly conducting experiments in attribute recognition. This decision stems from our goal to demonstrate the efficacy of ATPR in the context of pedestrian retrieval, where attributes serve as supplementary information to improve retrieval accuracy. Therefore, although ATPR holds potential in attribute recognition, our experiments and analyses have been intentionally directed towards its application in attribute-guided retrieval, aligning with the main objective of our research.

10. About The PAR Dataset

In order to avoid raising ethical concerns, the PAR dataset [32] used in this paper is a publicly available dataset. For the PAR dataset used in this paper, we have accepted/signed the corresponding license agreement and do not modify any content in the dataset. In addition, the dataset used in this paper are obtained from their download link on the official website. We also acknowledge the use of the data by citing their corresponding literature.

Table 5. Attribute Grouping Information.

Group a^1 (Basic Personal Attributes)
Gender (Female:0 Male:1)
Age 16
Age 30
Age 45
Age 60
Body type slightly overweight
Body type standard
Body type slim

Group a^2 (Head and Shoulder)
Hairstyle bald
Hairstyle long hair
Head and shoulders black hair
Head and shoulders wearing a hat
Head and shoulders glasses
Head and shoulders sunglasses
Head and shoulders scarf
Head and shoulders mask

Group a^3 (Upper Body Clothing)
Upper garment shirt
Upper garment sweater
Upper garment vest
Upper garment T-shirt
Upper garment cotton clothes
Upper garment jacket
Upper garment suit
Upper garment hoodie
Upper garment short sleeves
Upper garment other
Upper garment color black
Upper garment color white
Upper garment color gray
Upper garment color red
Upper garment color green
Upper garment color blue
Upper garment color silver
Upper garment color yellow
Upper garment color brown
Upper garment color purple
Upper garment color pink
Upper garment color orange
Upper garment color other

Group a^4 (Lower Body Clothing)
Lower garment trousers
Lower garment skirt
Lower garment short skirt
Lower garment dress
Lower garment jeans
Lower garment leggings
Lower garment color black
Lower garment color white
Lower garment color gray
Lower garment color red
Lower garment color green
Lower garment color blue
Lower garment color silver
Lower garment color yellow
Lower garment color brown
Lower garment color purple
Lower garment color pink
Lower garment color orange
Lower garment color other

Group a^5 (Footwear)
Shoe type leather shoes
Shoe type sports shoes
Shoe type boots
Shoe type cloth shoes
Shoe type casual shoes
Shoe type other
Shoe color black
Shoe color white
Shoe color gray
Shoe color red
Shoe color green
Shoe color blue
Shoe color silver
Shoe color yellow
Shoe color brown
Shoe color purple
Shoe color pink
Shoe color orange
Shoe color mixed
Shoe color other

Group a^6 (Accessory)
Accessory backpack
Accessory shoulder bag
Accessory handbag
Accessory suitcase
Accessory plastic bag
Accessory paper bag
Accessory car
Accessory other