

Joint Instance and Feature Importance Re-weighting for Person Reidentification

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Definition of Person Reidentification

Person re-identification refers to the task of recognizing the same person under different non-overlapping camera views and across different time and places.



Challenges of Person Reidentification

➤ Illumination change



➤ View change



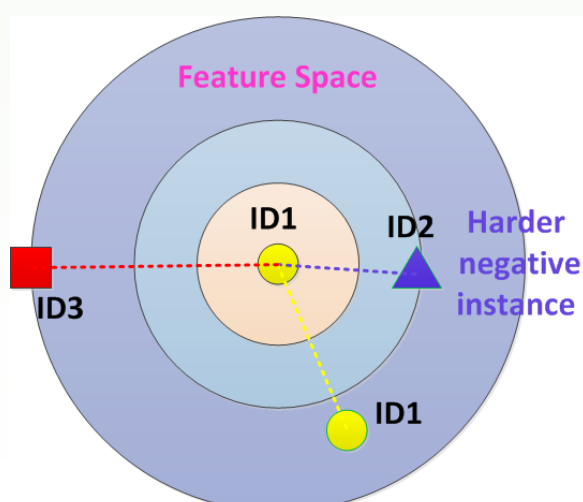
➤ Pose change



➤ Occlusion



Drawbacks of Existing Metric Learning Algorithms



Instances are equally considered Feature channels are equally considered



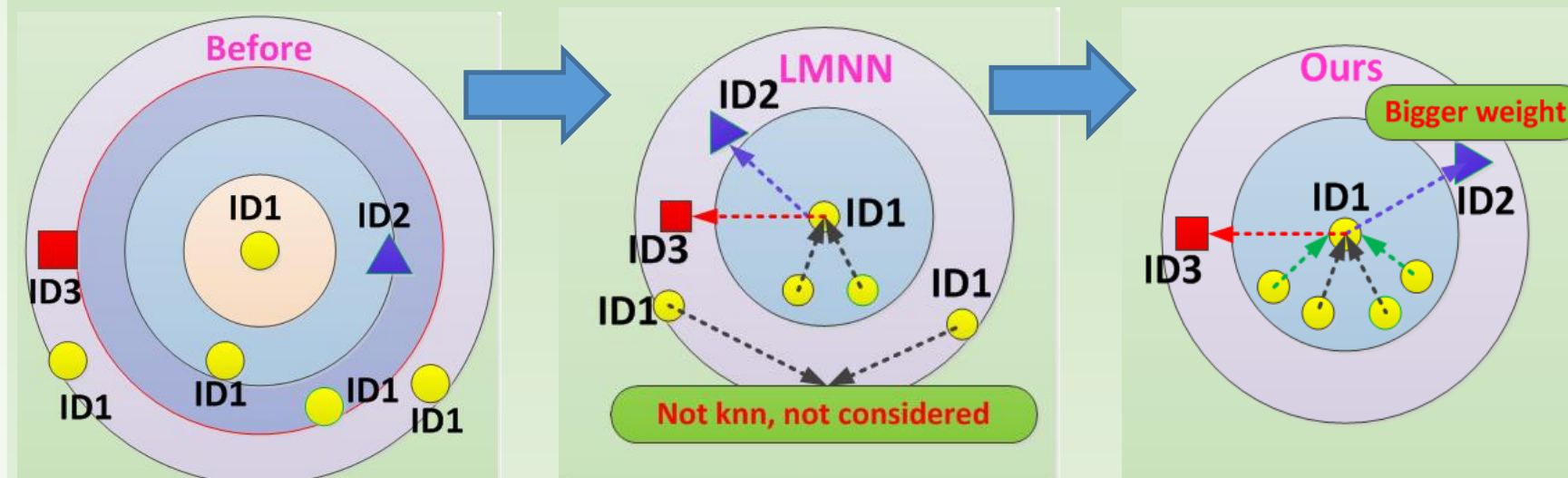
Solutions

Instance importance re-weighting: Giving hard instances larger weights, such that instances sensitive to the model parameters are more carefully considered.

Feature importance re-weighting: Using $L_{2,1}$ regularization to automatically mine the feature importance, such that important local features play a more important role in person reidentification.

Improved LMNN for Instance Selection

Target: Pull target neighbors together and push impostors faraway.



Improvements over LMNN:

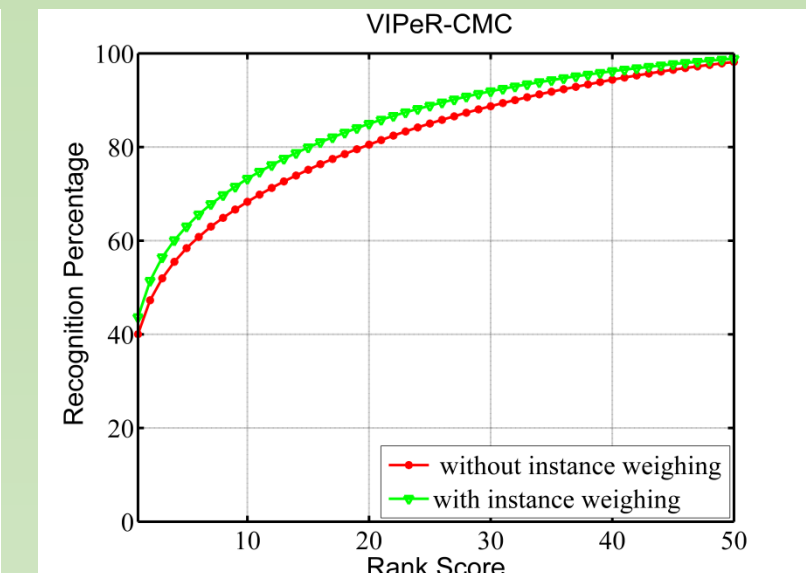
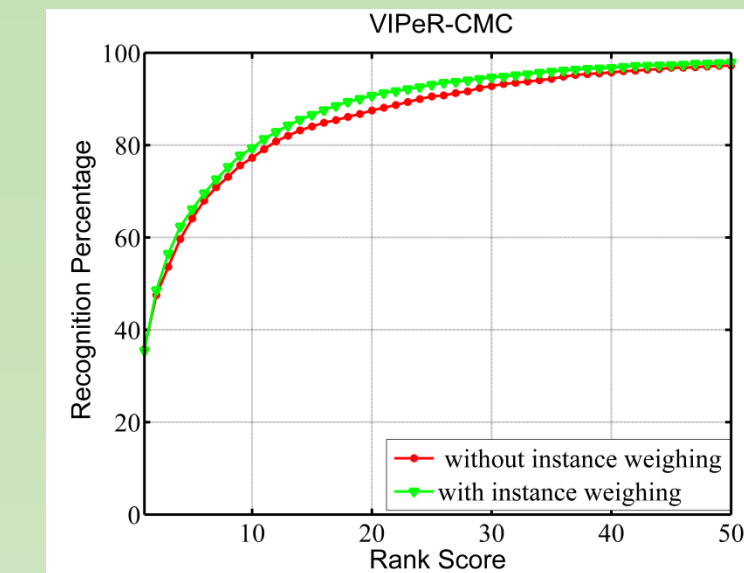
- (1) All positive pairs are supposed to be closer than negative pairs after learning, instead of only k nearest neighbors;
- (2) Harder negative instances are supposed to be more carefully considered (given bigger weights), because they are more easily to be misclassified.

$L_{2,1}$ Regularization for Feature Selection

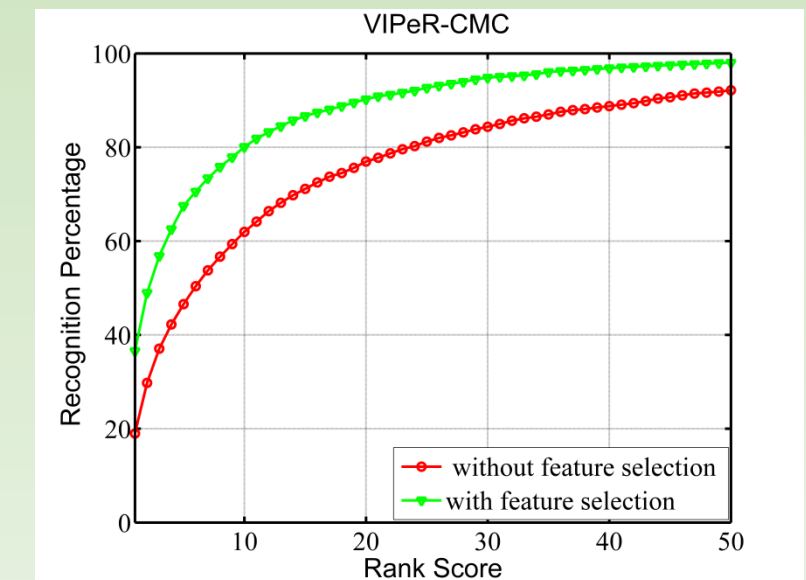
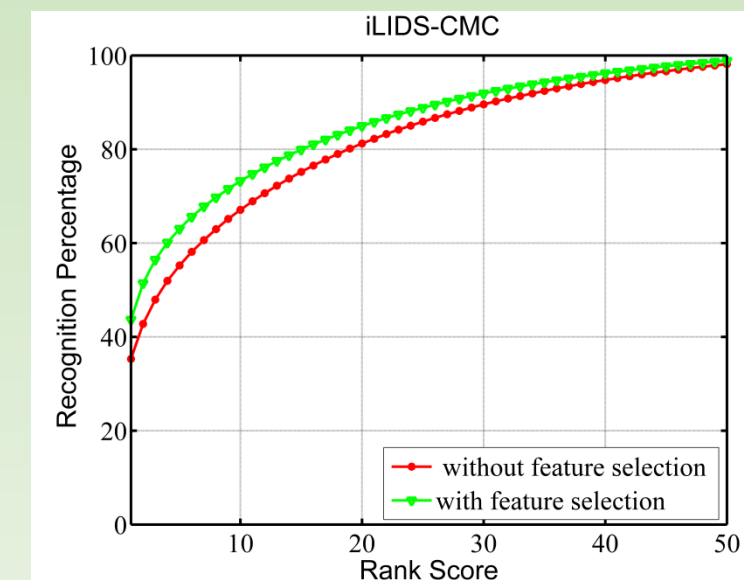


Insights: Patch 1 all corresponds to the background, which acts as noise for foreground appearance, thus should be neglected (related feature channel weights should be low); Patch 2 all corresponds to the main body part, which represents the key visual cue of human appearance, thus is very important (larger weights); Part of patch 3 corresponds to the foreground, the weights are supposed to be between patch 1 and patch 2.

Experimental Results



Improvements by instance importance re-weighting



Improvements by feature importance re-weighting

Conclusions

Instance importance re-weighting can slightly boost the person re-identification performance, while the feature importance re-weighting can boost the performance by a large margin, which implies that the importance of different feature channels do vary across different patches, and $L_{2,1}$ regularization can automatically perform feature selection.

References

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