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IMAGE DOMAIN ADAPTION OF SIMULATED DATA FOR HUMAN POSE ESTIMATION

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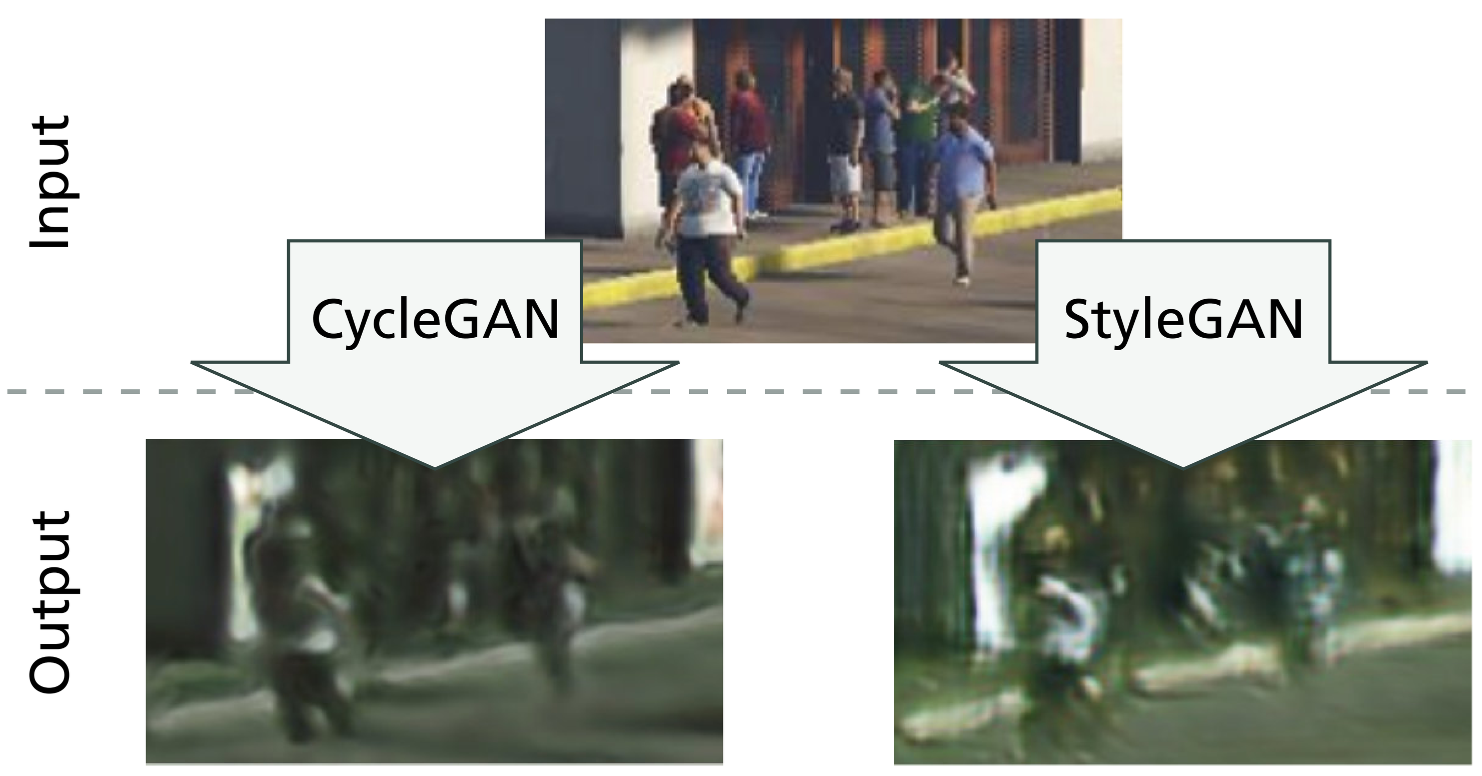
MOTIVATION

- Skeletons are low-dimensional representations of human beings, hence suitable for real-time analysis in 2D computer vision
- Labeled data from COCO and MPII are not suitable since domain gap is quite big
- Synthetic data can be designed in such way to fullfill requirements for application oriented training data
- Pure synthetically generated data comes also with a domain gap that has to be reduced

Person Pose Estimation for Crowded Scenarios

- Training datasets for human pose estimation are not designed for tackling crowded situations
- Earlier attemps like [2] come with a different understanding of „crowdedness“
- Our approach is to generate training data by simulating it using a video game engine as proposed in [1] and adapt this data to our target domain

FIGURE 1



Domain adaption using two different architectures. CycleGAN proves itself with all introduced extensions to provide best results in image detail conservation.

Contribution

- Detailed examination of two different GAN architectures: Cycle-GAN and Style-GAN
- Experiments with various expansions of baseline architecture for detail preservation
- Exhaustive experiments using different target domains plus detailed comparison and evaluation

Experiments

- We evaluated three target domains for the domain adaption task, defined by three datasets: WorldExpo 10 [4], Cityscapes [5] and some internal data
- For evaluation the chosen architecture [3] was trained on the generated data (and on CrowdPose [2])
- Evaluation results are reported on data recorded in a surveillance-like scenario (many people at small scale in urban environment)

RESULTS

Training Dataset	mAP	mAP_{Easy}	AP_{Med}
SyMPose	16.4 ± 0.2	45.1 ± 2.9	16.1 ± 0.3
CrowdPose [2]	23.2 ± 0.4	77.3 ±1.6	22.4 ± 0.3
SyMPose2CS	8.9 ± 0.8	45.9 ± 2.5	8.6 ± 0.9
SyMPose2W10	16.8 ± 0.4	53.2 ± 2.2	16.7 ± 0.5
SyMPose2IOSB	17.4 ± 0.3	49.0 ± 4.3	17.1 ± 0.2
(SyMPose + SyMPose2IOSB)	18.4 ± 0.3	53.0 ± 1.1	17.9 ± 0.3

Conclusion

- Human pose estimation in surveillance applications is very challenging and missing appropriate data
- Adapting synthetically generated data to overcome this lack of data is a way to alleviate the problem
- Finding a suited target domain for the adaption task is crucial for increasing performance

References

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