KLE Technological University
Creating Value
Leveraging Knowledge

Enhancement of videos captured in Low-light conditions

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Problem statement

To propose a learning-based technique for Enhancement of videos captured in Low-light conditions.

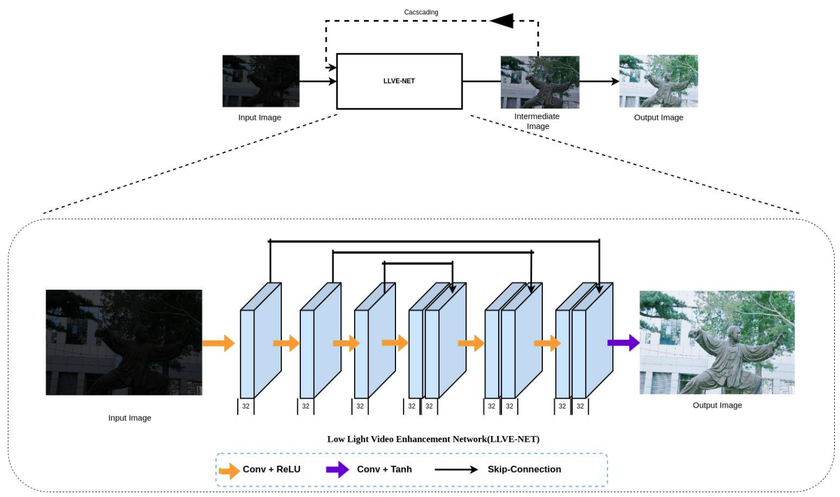
Objective

- To perform extensive research on available SOTA methods for low-light video enhancement
- To develop a learning-based algorithm for enhancement of video captured in low light conditions
- To demonstrate the results of the proposed architecture using benchmark dataset in comparison with SOTA methods

Literature survey

- **LLCNN** (CVPR 2017): They have used simple convolution network with residual network.
- **Zero-DCE** (CVPR 2020): Unsupervised learning technique using unpaired data.
- **From Fidelity to Perceptual Quality** (CVPR 2020): A Semi-supervised learning approach using DRBN.
- **Extremely Low-light Image Enhancement with Scene Text Restoration** (CVPR 2022): Simple U-NET architecture used to restore the text to complete the pipeline

Proposed architecture



Results

Contributions

- In this paper we have implemented perceptual loss in addition to the losses used in zero-DCE
- We proposed a cascade approach to our model for it to learn more characteristics both locally and globally. The enhanced image has been predicted more accurately.

Conclusion

We have proposed a deep network which can be trained with both zero reference and paired inputs. This is accomplished by redesigning the Zero-DCE network. Experiments show that our solution outperforms existing light enhancement technologies.

Model	PSNR	SSIM
Zero-DCE	16.57	0.59
LLVE-Net	**27.4**	**0.7**
Zeo-DCE(NTIRE)	10.22	0.37

Future work

- To develop a denoising algorithm as a plugin to unsupervised approach
- Introducing stopping Criteria for the Cascaded Network
- Introduce a method to reduce video jitter