

Improved Contrast Enhancement Algorithm for Night Vision Systems using Thermal Camera

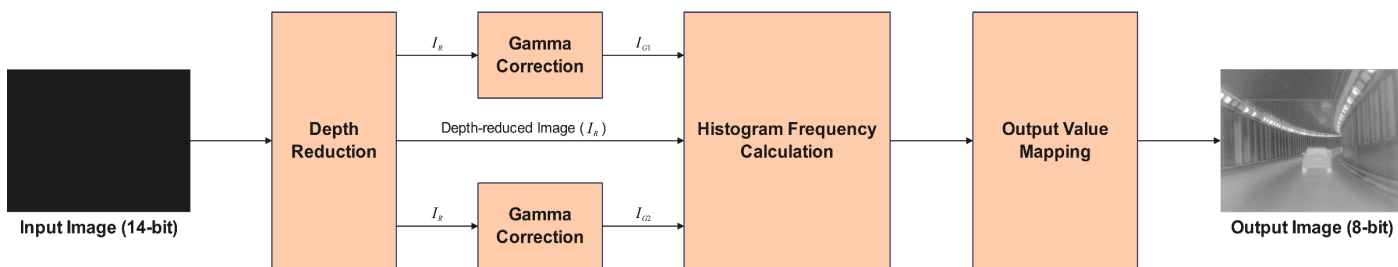
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Introduction

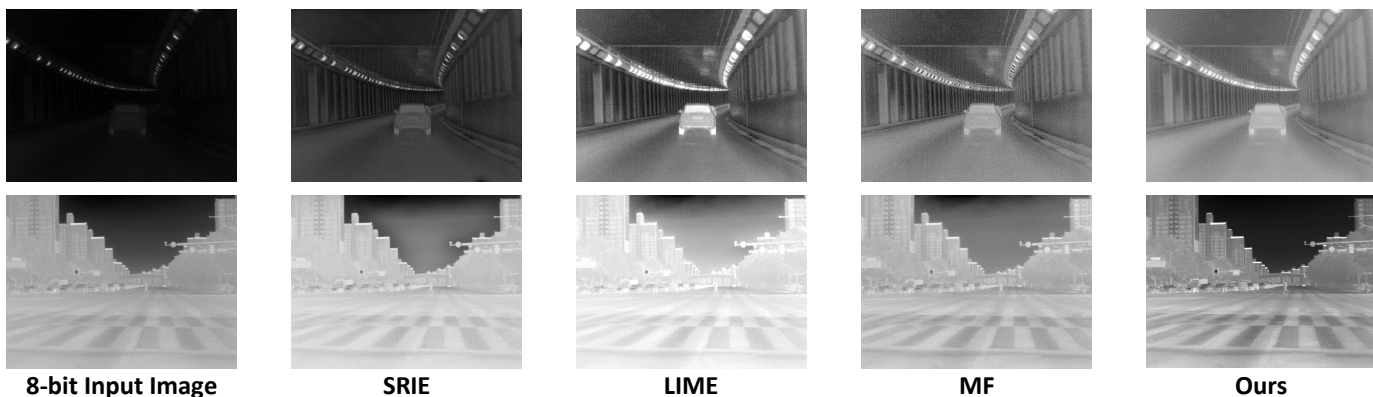
- In a long-wave infrared (LWIR)-based thermal camera with an uncooled detector, a contrast enhancement algorithm is necessary to improve visibility
- Conventional contrast enhancement algorithms do not have consistent performance across various driving scenarios.

Proposed Algorithm



- **Depth Reduction:** Aim to decrease the bit depth from N-bit to 8-bit
- **Gamma Correction:** Generate a brightness level-adjusted image to handle extremely low or high pixel levels
- **Histogram Frequency Calculation:** Generate the merged histogram frequency look-up table
- **Output Value Mapping:** Generate a contrast-enhanced output image

Experimental Results



- When using our proposed algorithm, it demonstrates relatively consistent contrast enhancement performance in both the worst and best driving scenarios

Conclusion

- We proposed an improved contrast enhancement algorithm consisting of gamma correction and histogram equalization
- In the worst driving scenario, it can be visually confirmed that the both the conventional and proposed algorithms perform well
- In the best driving scenario, it can be visually confirmed that our proposed algorithm has better visual performance than conventional algorithms