# View Review

**Paper ID**
4378

**Paper Title**
LLDB: Efficient Low-Light Image Enhancement with Difffusion Bridge

**Track Name**
ICASSP 2025 Main Tracks

REVIEW QUESTIONS

**1. How confident are you in your evaluation of this paper?**
2. Confident

**2. Importance/Relevance**
2. Of limited interest

**3. Justification of Importance/Relevance Score (required if score is 1 or 2).**
This paper explores low-light image enhancement, presenting an innovative approach based on the diffusion bridge. Low-light image enhancement is essential in fields like autonomous driving, security monitoring, and medical imaging, making this research highly relevant and of broad interest.

**4. Classify the type of paper**
Neutral

**5. Originality/Novelty**
3. Moderately original; provides limited new insights or understanding

**6. Justification of Originality/Novelty Score (required)**
This paper is the first to apply the diffusion bridge concept to low-light image enhancement, combined with a nonlinear activation network and Gamma correction module to improve image quality. This innovative design performs excellently under low-light conditions, significantly surpassing current state-of-the-art (SOTA) methods.

**7. Theoretical Development**
3. Probably correct; provides limited new insights or understanding

**8. Justification of Theoretical Development Score (required if score is 1 or 2).**
The authors provide a detailed derivation of the mathematical foundation of the diffusion bridge, combining the Ornstein-Uhlenbeck process and Doob's h-transform for a more stable diffusion process. The theoretical development is correct and innovative, supporting the method’s application in low-light image enhancement.

**9. Experimental Validation**
3. Limited but convincing

**10. Justification of Experimental Validation Score (required if score is 1 or 2).**

The paper rigorously validates the proposed method across multiple datasets (LOLv1, LOLv2-real, and LOLv2-syn) and demonstrates improvements across key metrics over current methods. The experimental design is sound, and the validation is comprehensive.

**11. Clarity of Presentation**

3. Clear enough

**12. Justification of Clarity of Presentation Score (required if score is 1 or 2).**

The paper has a clear structure and logical flow. The framework and experimental results are presented through well-designed figures and tables, making the work easy to follow.

**13. Reference to Prior Work**

3. References adequate

**14. Justification of Reference to Prior Work Score (required if score is 1 or 2).**

The paper cites a substantial amount of relevant work in low-light image enhancement and diffusion models. However, there is room to improve by adding references to some of the latest models, especially in comparative discussions.

**15. Overall evaluation of this paper**

3. Marginal accept

**16. Justification of Overall evaluation of this paper (required)**

This paper demonstrates notable strengths in both innovation and applicability. The method outperforms current approaches in terms of image quality and offers practical benefits with fewer parameters and fewer sampling steps. Its contributions to low-light image enhancement are significant.

**17. Award Quality (only for papers marked “Definite accept”)**

1: Award quality

**18. Award Quality (Justification)**

The paper shows strong innovation and addresses a critical issue in real-world applications. The method is both effective and efficient, making it a solid candidate for a conference award.

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Agreement accepted