NR-IQA with Gaussian derivative filter, Convolutional Block Attention Module and Spatial pyramid pooling

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1. Introduction

- The rapid growth of digital platforms leads to millions of diverse images shared daily, highlighting the need for effective image quality management in fields like medical, autonomous systems, face recognition.
- Image Quality Assessment (IQA) task evaluates image quality based on the human visual system.
- This study combines Gaussian derivatives for detail capture, CBAM for key feature emphasis, and spatial pooling for feature aggregation, enhancing IQA by better aligning with the human visual system's sensitivity.
- Proposed method is analyzed across various databases LIVE, CSIQ,LIVE Wild, LIVE-MD and IVC utilizing two metrics SROCC and PLCC.

2. Methodology

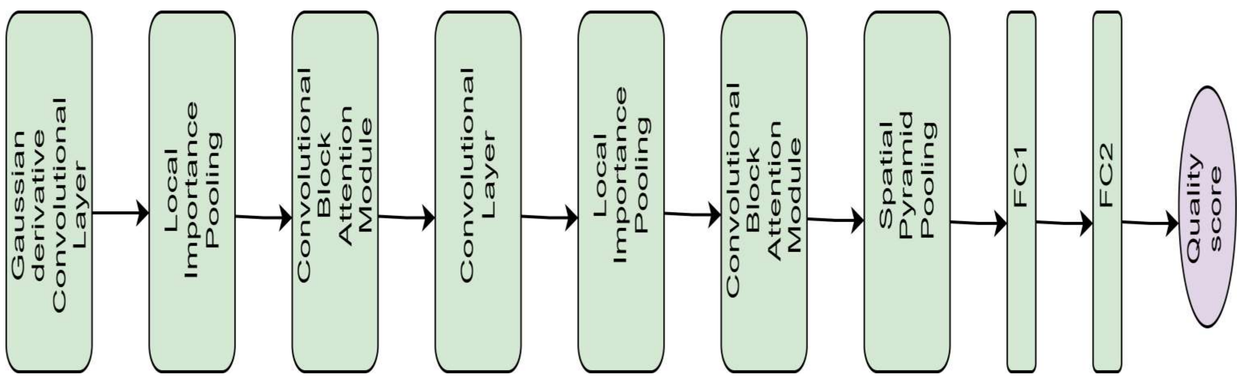

Fig. 1 Proposed Architecture for No-Reference IQA

3. Results and Discussion

- Our proposed method employs Gaussian derivatives to capture fine texture details and uses CBAM to enhance important features through attention mechanisms. A spatial pooling layer aggregates these features, resulting in a robust representation for quality evaluation that aligns with the human visual system's sensitivity to image quality.
- Table-1 and Table-2 shows the effectiveness of the proposed method and Fig-2 shows the scatter plots of the proposed method which shows high correlation among the scores predicted by proposed method and subjective scores.

SROCC on LIVE Database		SROCC on IVC Database	
Method	**LIVE**	**Method**	**LIVE**
CONTRIQUE	0.961	LPIPS	0.809
Deepsim	0.968	Proposed	0.94
dipIQA	0.958		
GraphIQA	0.98		
LPIPS	0.934		
MEON	0.954		
UNIQUE	0.968		
Proposed	0.964		

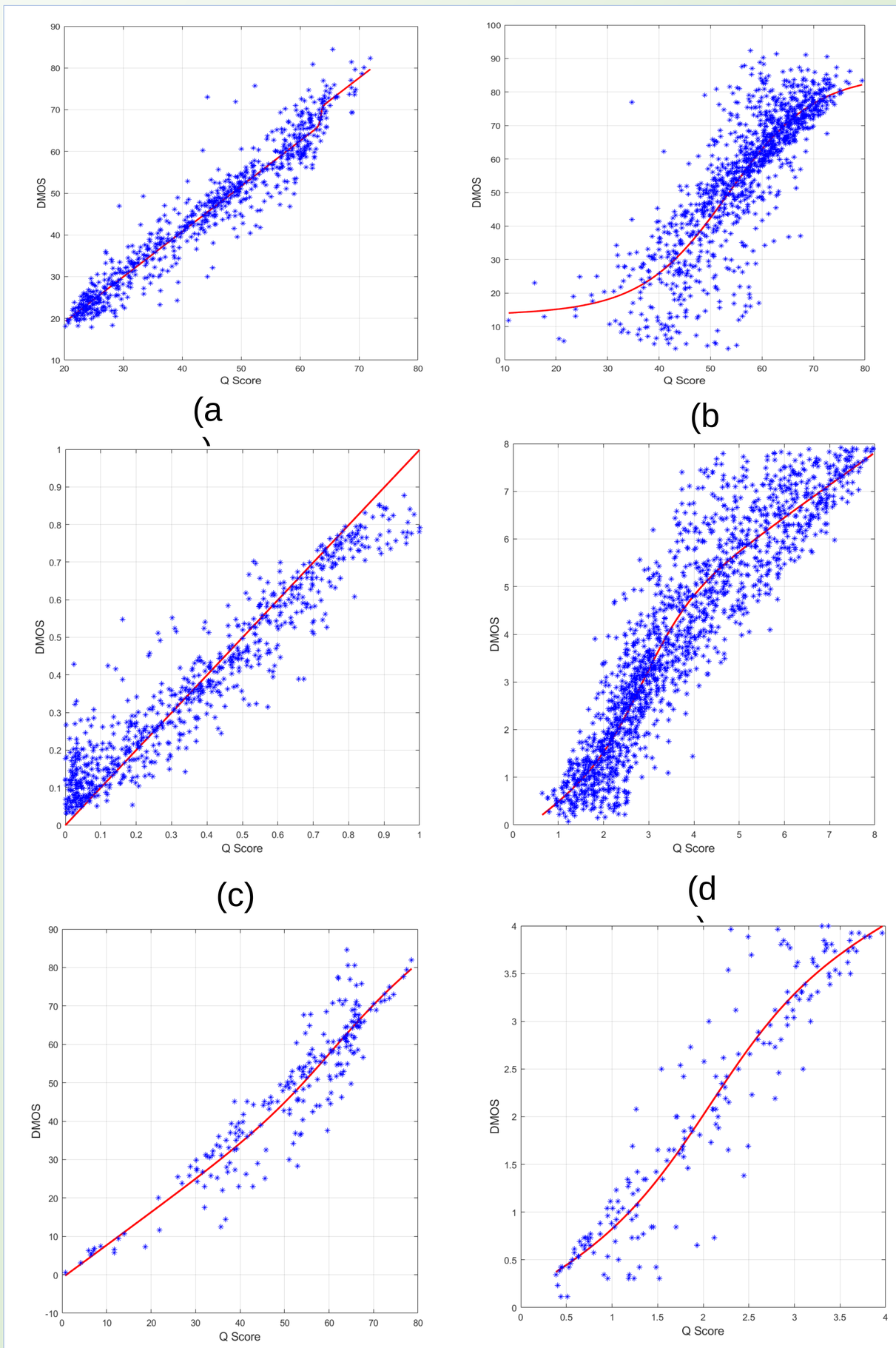

Fig. 2. Scatter plots of quality scores, predicted by Proposed method vs Subjective scores(MOS/DMOS) of (a)LIVE (b) LIVE Wild (c) CSIQ (d) MDID-2016 (e) LIVE-MD and (f) IVC databases

4. Conclusions

- This paper validates performance of proposed method in handling both synthetic and authentic distortions in Image Quality Assessment (IQA) tasks.
- The results highlight the robustness and effectiveness of the proposed approach in accurately assessing image quality across different types of distortions and diverse datasets..

5. Key References

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