Deep Stereo Image Compression via Bi-directional Coding

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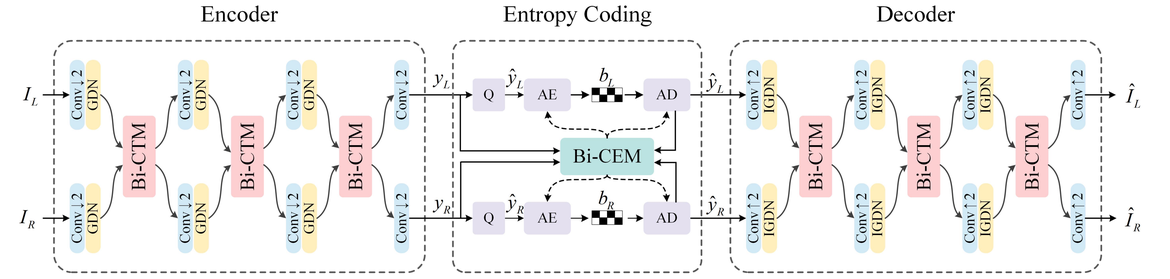
Motivation

- Compression of stereo images needs to reduce the inter-view redundancy in addition to the intra-view redundancy.
- The existing methods mainly employ a unidirectional coding mechanism to reduce the inter-view redundancy.
- The unidirectional framework has two drawbacks:
  - ❖ It is not always effective to reduce the inter-view redundancy.
  - ❖ It is difficult to extend the framework into a bi-directional coding framework that is expected to be more effective in reducing the inter-view redundancy, hence, saving the bitrate.

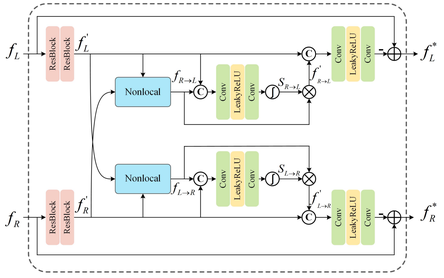
Contribution

- A novel end-to-end stereo image compression network based on bi-directional coding (BCSIC-Net) is proposed to improve the performance of stereo image compression by effectively exploiting the inter-view correlation.
- A bi-directional contextual transform module (Bi-CTM) that performs nonlinear transform conditioned on the inter-view context is presented to effectively reduce the redundancy between stereo views.
- A bi-directional conditional entropy model (Bi-CEM) is developed to improve the efficiency of entropy coding by exploiting the inter-view correspondence as a conditional prior.
- Experimental results on popular benchmark datasets show that the proposed method achieves the state-of-the-art coding performance.

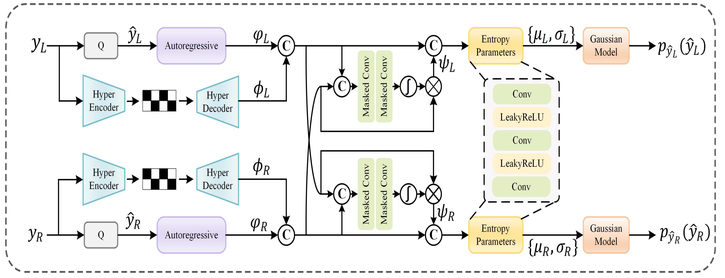
Proposed Method



(a) BCSIC-Net

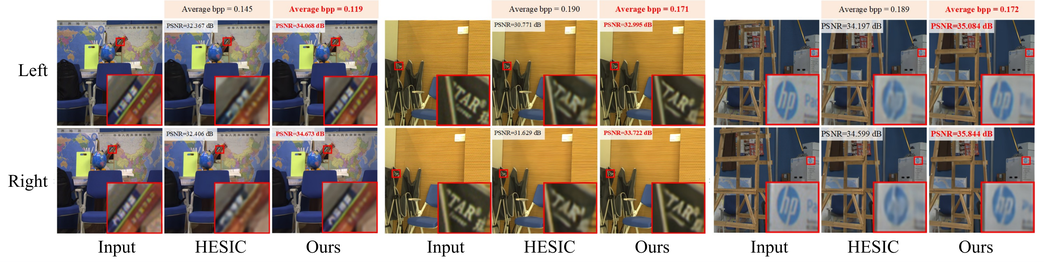


(b) Bi-CTM

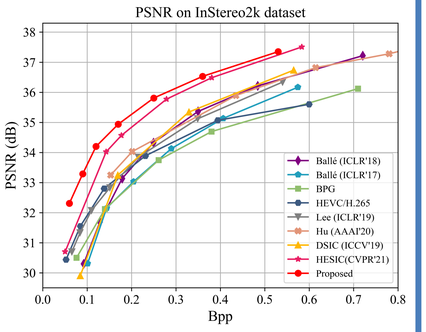


(c) Bi-CEM

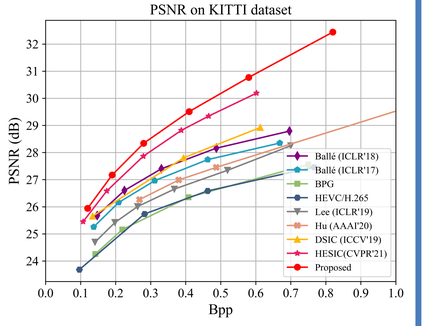
Visualization



RD Peformance



Methods	BD-PSNR (dB)	BD-rate (%)
DSIC (ICCV'19) [24]	0.238	-7.062
HESIC (CVPR'21) [13]	1.373	-38.809
Proposed	**1.778**	**-45.745**



Method	BD-PSNR (dB)	BD-rate (%)
DSIC (ICCV'19) [24]	0.005	-4.027
HESIC (CVPR'21) [13]	0.920	-28.836
Proposed	**1.518**	**-39.068**