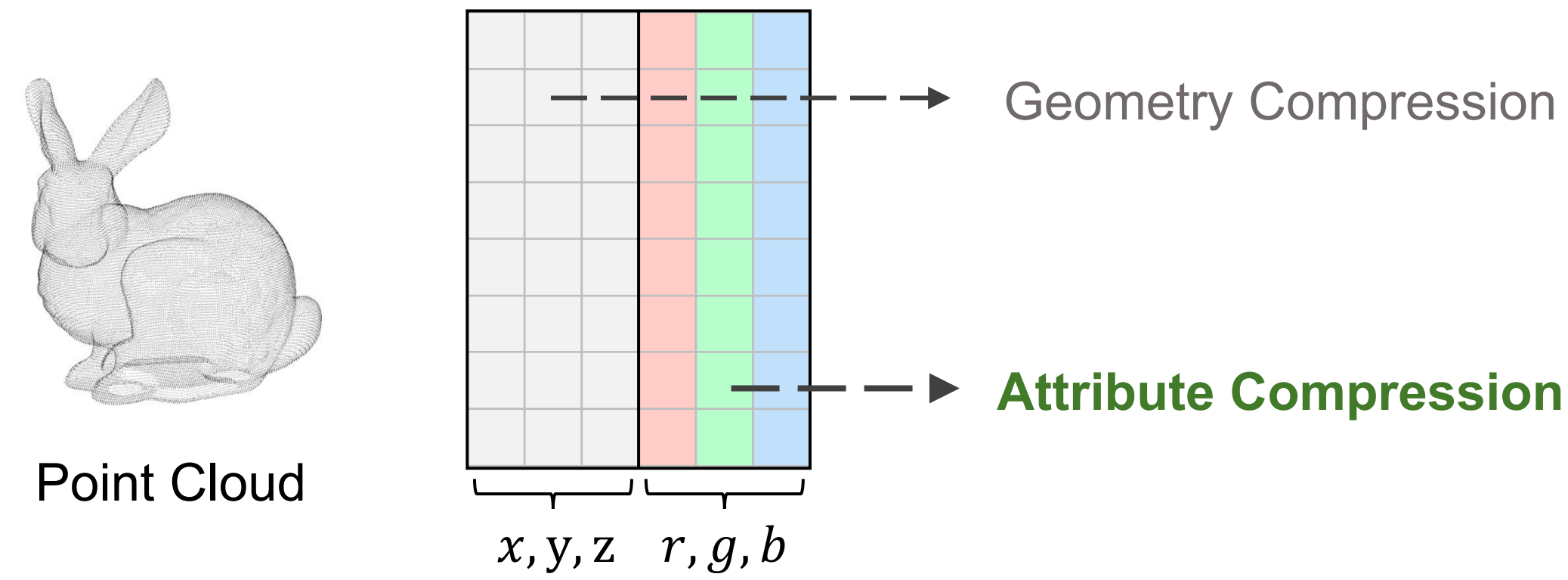


3DAC: Learning Attribute Compression for Point Clouds

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Introduction

Point Cloud Compression



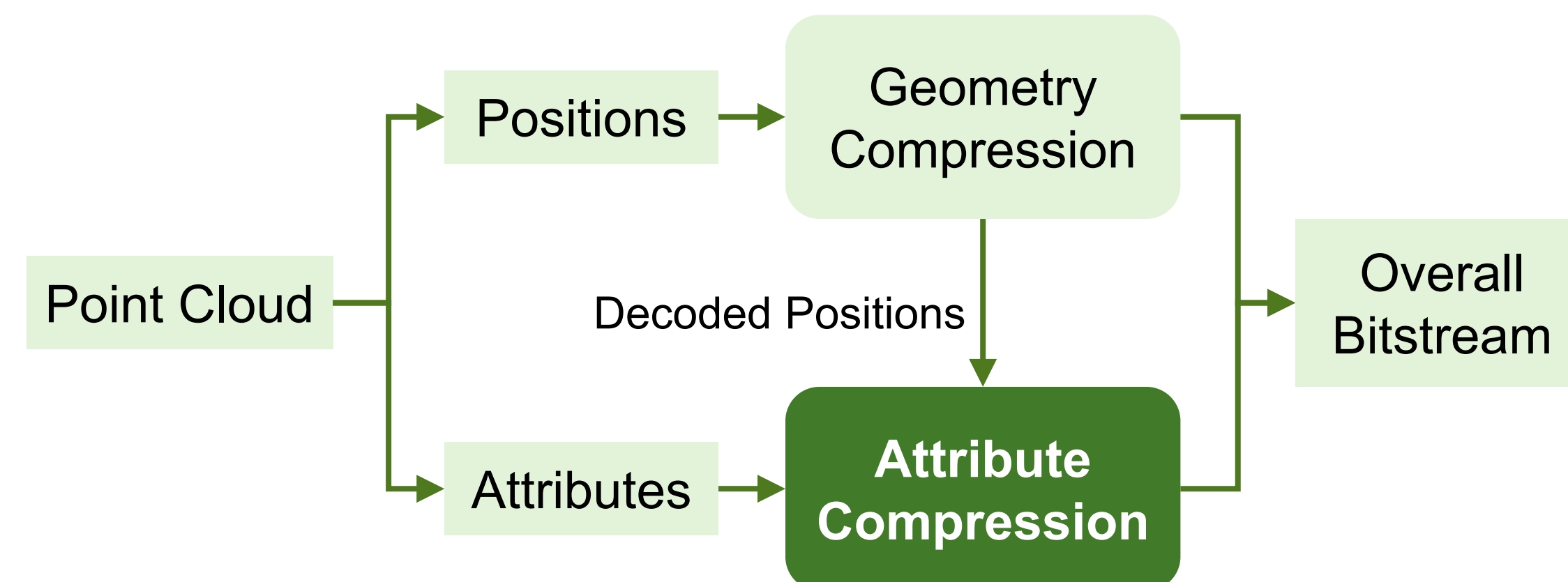
Contributions

- A learning-based framework for attribute compression.
- An attribute-oriented entropy model.
- State-of-the-art compression performance.
- Paper, code and project: <https://fatpeter.github.io/>

Problem Definition

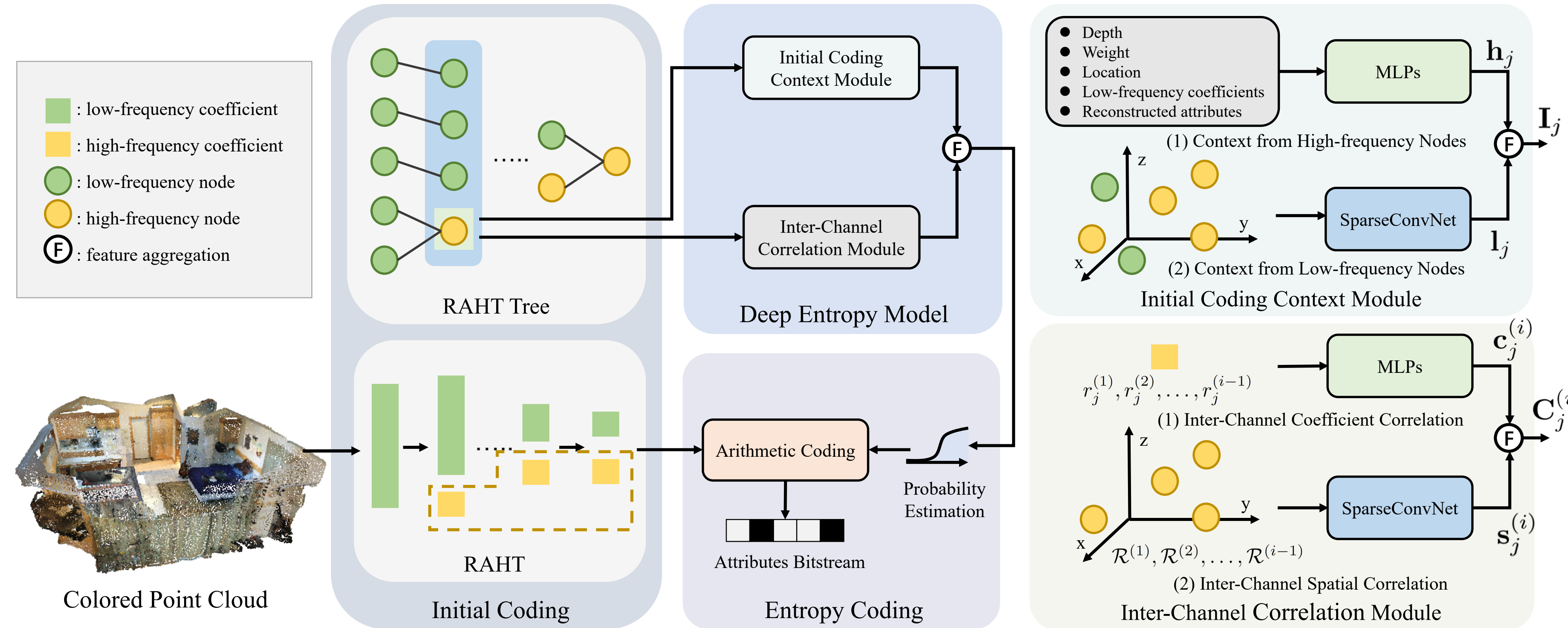
Goal: Given a 3D point cloud, its geometry is assumed to have been transmitted separately and we mainly focus on the task of point cloud attribute compression.

Compression Pipeline



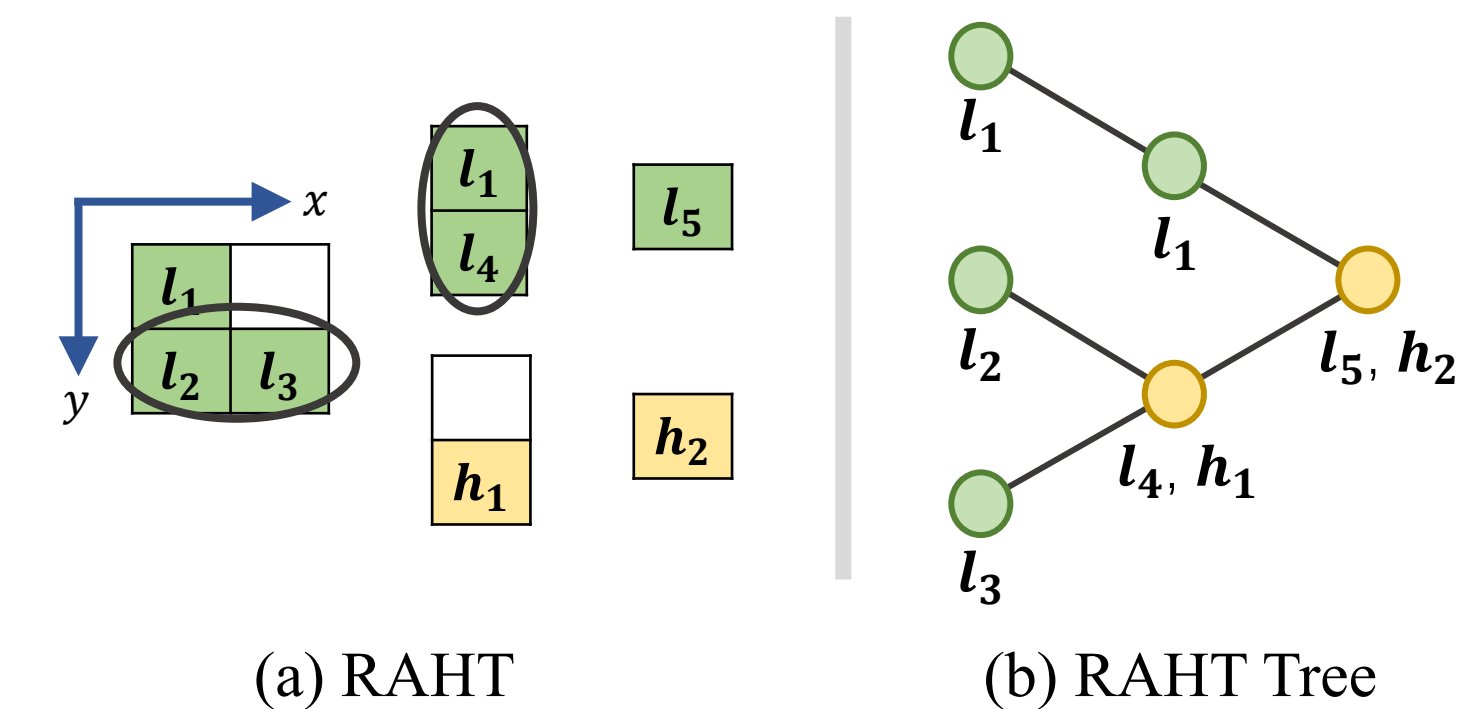
Method

Framework



Initial Coding

We adopt Region Adaptive Hierarchical Transform (RAHT) for initial coding and construct the RAHT tree for context feature extraction.



Learning

During training, we approximate the estimated distribution with the actual distribution by minimizing the cross-entropy loss:

$$\ell = - \sum_i \sum_j \log q(r_j^{(i)} | \mathbf{I}_j, \mathbf{C}_j^{(i)}).$$

Deep Entropy Model

Formulation

Given transformed coefficients R , we factorize its probability distribution at the attribute channel i with initial coding context \mathbf{I} and inter-channel correlation $\mathbf{C}^{(i)}$ as follows:

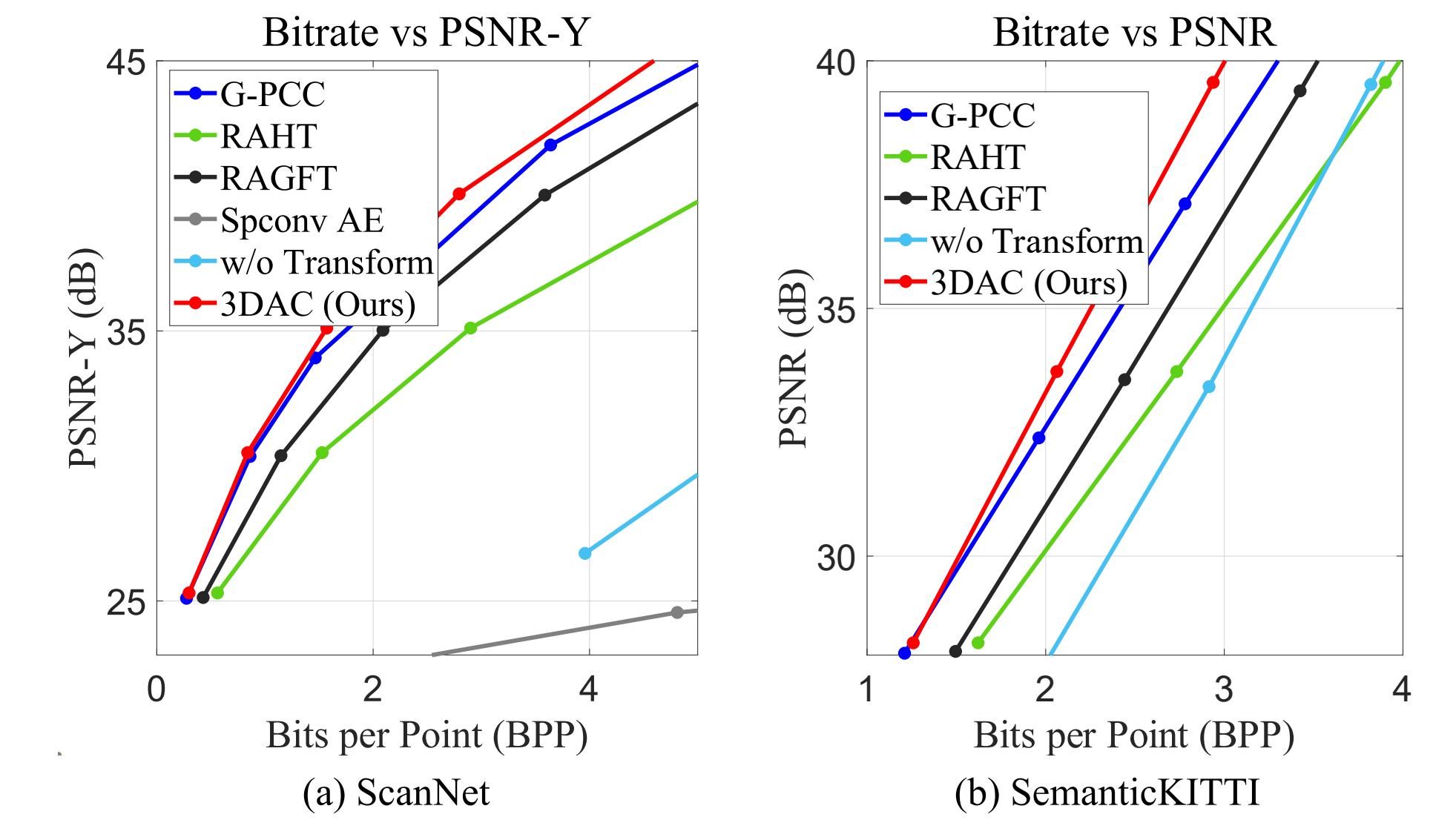
$$q(\mathcal{R}^{(i)}) = \prod_j q(r_j^{(i)} | \mathbf{I}_j, \mathbf{C}_j^{(i)}).$$

Context Modelling

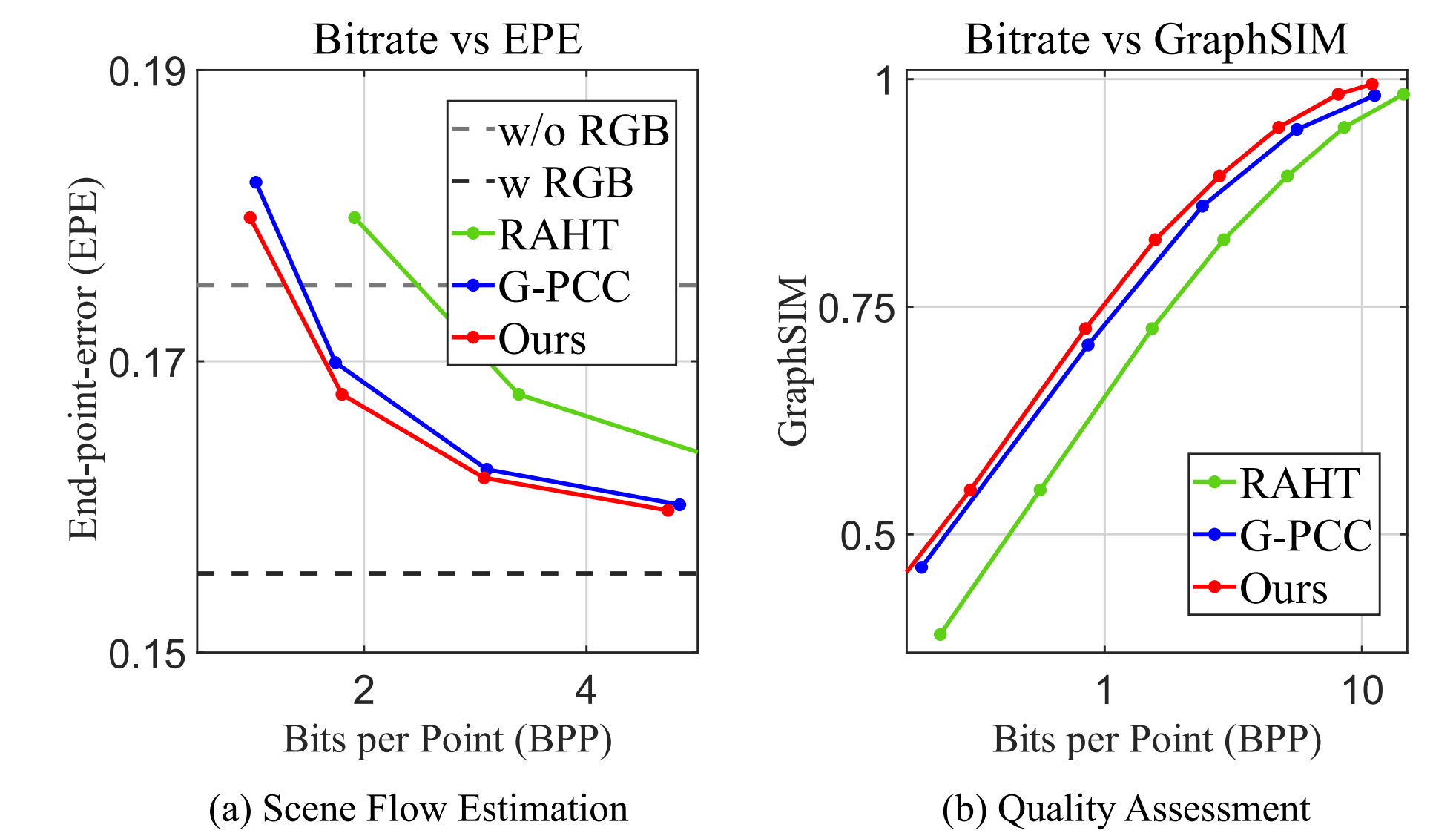
By exploring context information from the RAHT tree and the previous encoded attributes, we model the initial coding context \mathbf{I}_j and the inter-channel correlation $\mathbf{C}_j^{(i)}$ with our Initial Coding Context Module and Inter-Channel Correlation Module.

Experiments

Quantitative Results



Downstream Tasks



Qualitative Results

