Color Texture Description Based on Holistic and Hierarchical Order-Encoding Patterns

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1. Introduction

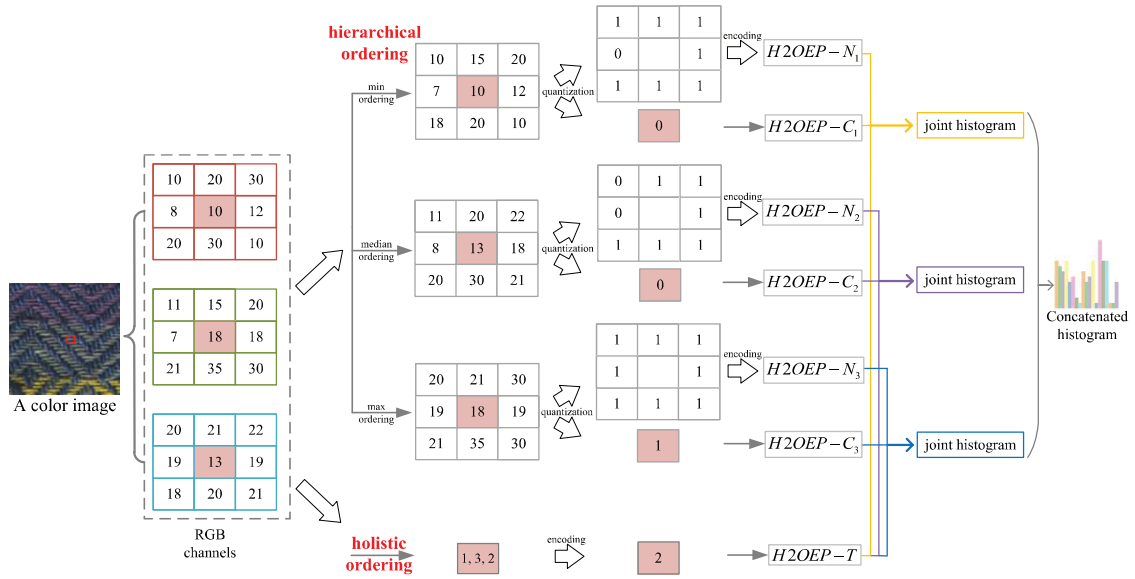
Motivation

- Take advantage of color information of an image.
- Use ranking (or ordering) based operator to describe texture structure or color information.
- Distinguish some distinct intensity patterns (e.g., [1 2 3 4] and [10 20 30 40]) in an image, rather than relying on the relative intensity values.

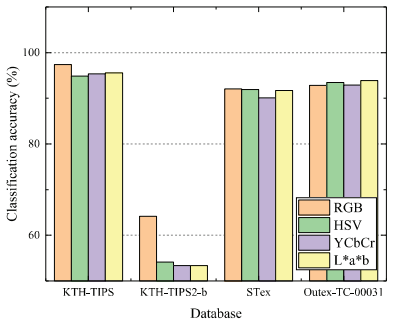
Main contributions

- We propose a novel color image descriptor named Holistic and Hierarchical Order-Encoding Patterns (H2OEP) for texture classification.
- In H2OEP, the holistic order-encoding pattern compactly encodes color order variation tendencies for each pixel in color space.
- The hierarchical order-encoding pattern leverages min ordering, median ordering and max ordering to encode local neighboring relationships across different color channels.
- Experiments on four benchmark texture databases demonstrate the effectiveness of the proposed descriptor for color texture classification.

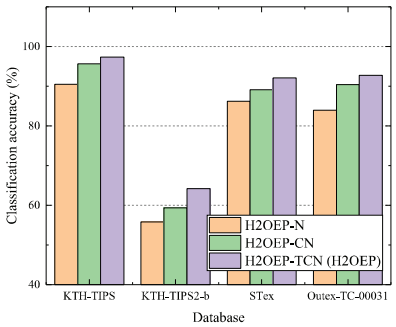
2. Main Framework



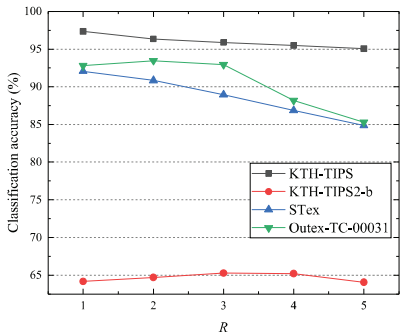
3. Experimental results



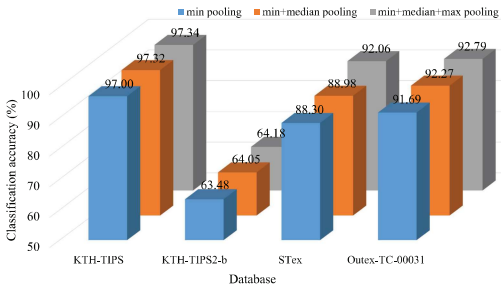
Effects of different color spaces.



Effects of different operators.



Effects of different sampling configurations.



Effects of different ordering schemes.

TABLE I: Classification accuracy in percent (mean±standard deviation) on four color texture databases

Method	KTH-TIPS	KTH-TIPS2-b	STex	Outex-TC-00031	Dimension
LBP	94.44±0.63	55.82±1.84	82.02±0.58	88.46	1665
CLBP	94.71±1.93	56.97±0.84	87.65±0.56	84.12	4056
SLGP	94.04±1.56	53.56±4.54	78.81±0.64	76.76	504
mGIST	96.20±1.05	53.15±1.77	60.28±0.54	79.60	1536
mSIFT	92.10±1.36	55.52±2.90	35.85±0.35	44.78	3000
Full ranking	93.52±0.84	51.00±2.81	64.90±0.32	81.47	720
maLBP	93.17±1.22	54.36±5.56	86.17±0.60	82.86	1024
mdLBP	95.12±1.11	58.31±6.04	90.08±0.45	86.39	2048
LBPC	92.92±1.24	50.74±2.40	75.54±0.57	84.40	256
SWOBP	95.98±0.99	64.17±2.91	89.53±0.43	**93.20**	2226
H2OEP	**97.34**±0.79	**64.18**±2.82	**92.06**±0.33	**92.79**	1062