Joint Spectral Correspondence for Disparate Image Matching

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Matlab Implementation Details

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Outline

Dense SIFT features

Adjacency Matrix

Laplacian and its Eigen decomposition

Reconstruction using Eigenvectors

MSER features extraction and matching

Dense SIFT features

- Each image is resized to control total number of pixels
- One way is to use `vl_dsift` function. It will give 128D feature at each keypoint.
  - binsize 6 pixels
  - step(stride size) 4 pixels
- According to paper, sift feature is extracted for each key point for two scales i.e. two binsize : 10 and 6 pixels and concatenate them to create 256D feature at each key point
- For that, `vl_sift` is called twice for each binsize with keypoints specified in frames

Adjacency Matrix

- `pdist` is used to create adjacency matrix for intra image pixels
- `pdist2` is used to create adjacency matrix for inter image pixels
- cosine distance is used
- They are concatenated to create joint image graph adjacency matrix

Laplacian and its eigen decomposition

- Degree Matrix is obtained from Adjacency Matrix
- Normalized Laplacian is calculated using formula $L = I - D^{-1/2}WD^{-1/2}$
- `eigs` is used with parameter `sm` to get 5-6 eigenvectors with smallest eigenvalues

Reconstruction using Eigenvectors

- Eigenvector is divided into two halves - one for each image
- values are put back to each key point and other values are linearly interpolated using `interp2`

MSER features extraction and matching

- `vl_mser` is used for feature extraction
- `knnsearch` is used for feature matching in both images