Surface color estimation based on inter- and intra-pixel relationships in outdoor scenes

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Purpose
Estimate surface color under outdoor illumination robustly to image noise

Overview
MAP estimation and use of Markov Random Field

Algorithm
Pixel-wise
\[ p(S_1, E_{1,2} \mid I_{1,2}) \propto p(I_{1,2} \mid S_1, E_{1,2}) p(E_{1,2}) p(I_{1,2} \mid S_1, E_{1,2}) p(E_{1,2}) \]

Input Images
Model
Graphical Model
Optimization
Surface Image

Pixel-wise & spatial
Optimization: Iterated Conditional Modes
Initialization: Pixel-wise method

Quantity evaluation
<table>
<thead>
<tr>
<th>Mean RMSE [deg]</th>
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<tbody>
<tr>
<td>Finlayson '95</td>
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<tr>
<td>Kawakami '09</td>
</tr>
<tr>
<td>Pixel-wise</td>
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<tr>
<td>Pixel-wise &amp; spatial</td>
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</tbody>
</table>

Input image sets
- Input image 1
- Input image 2
- Finlayson '95
- Kawakami '09
- Pixel-wise
- Pixel-wise & spatial

Ground truth
- Ground truth
- Pixel-wise & spatial
- Pixel-wise
- Kawakami '09
- Finlayson '95

Natural scene
- Input 1
- Input 2
- Input 1 under canonical illumination
- Input 2 under canonical illumination