AUTOMATIC IMAGE ORIENTATION DETECTION
Main Goal:
- For any given picture detect its orientation.

Sub Goals:
- How to deal with color images
- Define criteria for images to separate them to 4 groups: $\omega = 0^\circ, \omega = 90^\circ, \omega = 180^\circ, \omega = 270^\circ$
- Efficiency: DB size, vector size, runtime.
What is Color?
What is Color?

Rods and cones

Rods:
- Extremely sensitivity to light
- Single photon response
- Low spatial resolution
- Single response profile
- B&W night vision (scotopic)

Cones:
- Relatively insensitive to light
- 100 photos for response comparable with rods
- High spatial resolution
- Different (3 types of) response profiles
- Color daylight vision (photopic)
Color representation - RGB
Color difference - RGB
Color representation - HSV
Classify function in MatLab
Peripheral blocks
Edge ratio
Feature Vector

- Image resolution = 800X600
- NXN blocks
- 4N-4 peripheral blocks
- For each block:
  - Mean of H,S,V
  - Var of H,S,V
  - Edge density

Vector size: N=4

Block size : 16
peripheral blocks: 12

Vector size:
12*(3+3+1)+4 = 88
## Results

<table>
<thead>
<tr>
<th>N</th>
<th>DB size</th>
<th>Color scheme</th>
<th>Feature Vector</th>
<th>Vector size</th>
<th>Test size</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>200</td>
<td>RGB</td>
<td>Mean</td>
<td>24</td>
<td>50</td>
<td>62%</td>
</tr>
<tr>
<td>3</td>
<td>200</td>
<td>RGB</td>
<td>Mean+var</td>
<td>48</td>
<td>50</td>
<td>34%</td>
</tr>
<tr>
<td>4</td>
<td>300</td>
<td>HSV</td>
<td>Mean</td>
<td>24</td>
<td>70</td>
<td>76%</td>
</tr>
<tr>
<td>4</td>
<td>300</td>
<td>HSV</td>
<td>Mean+edge</td>
<td>37</td>
<td>400</td>
<td>79%</td>
</tr>
<tr>
<td>4</td>
<td>300</td>
<td>HSV</td>
<td>Mean+Var+edge</td>
<td>88</td>
<td>400</td>
<td>82%</td>
</tr>
<tr>
<td>8</td>
<td>300</td>
<td>HSV</td>
<td>Mean+Var+edge</td>
<td>200</td>
<td>200</td>
<td>81%</td>
</tr>
</tbody>
</table>
Results
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Future work

- Improving the feature vector
- Testing new method of “machine learning”
- Add a rejection criteria
- Add classifier of indoor/outdoor
- Add an object recognition algorithm
Thank you!