SEEING. SENSING

INTRODUCTION TO UNISPECTRAL
Table of Content

1. Data analysis process
2. Water vs Oil
3. Fruits test - Real vs fake
4. Liquid's test - Red Wine / Vinegar / Coke / Soy Sauce
5. Fabrics test - Cotton vs Polyester
6. Grains Sorting test - Peanut vs Watermelon vs Pistachio
7. Apple's quality inspection
8. Leaves stress detection
Multispectral Data analysis process

1 Multispectral Cube
   • 10 bit - each pixel value in range [0-1024]

2 Spectral Data Extraction
   Objects region mean data reflectance values for each band wavelength

<table>
<thead>
<tr>
<th>Wavelength</th>
<th>713</th>
<th>736</th>
<th>759</th>
<th>782</th>
<th>805</th>
<th>828</th>
<th>851</th>
<th>874</th>
<th>897</th>
<th>920</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object A</strong></td>
<td>198.8</td>
<td>249.0</td>
<td>261.9</td>
<td>275.3</td>
<td>300.9</td>
<td>328.5</td>
<td>373.3</td>
<td>417.8</td>
<td>451.5</td>
<td>459.2</td>
</tr>
<tr>
<td><strong>Object B</strong></td>
<td>245.7</td>
<td>278.2</td>
<td>288.4</td>
<td>304.5</td>
<td>332.9</td>
<td>364.1</td>
<td>417.9</td>
<td>463.4</td>
<td>490.8</td>
<td>495.9</td>
</tr>
</tbody>
</table>

3 Multispectral footprint
   Raw data

4 Multispectral footprint
   Normalized
Multispectral test: Oil vs Water

**Classification**

**Multispectral footprint**

<table>
<thead>
<tr>
<th>Reflectance</th>
<th>Wavelength (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>713</td>
</tr>
<tr>
<td>0.95</td>
<td>736</td>
</tr>
<tr>
<td>0.9</td>
<td>759</td>
</tr>
<tr>
<td>0.85</td>
<td>782, 805, 828</td>
</tr>
<tr>
<td>0.95</td>
<td>851</td>
</tr>
<tr>
<td>0.9</td>
<td>874</td>
</tr>
<tr>
<td>0.85</td>
<td>897, 920</td>
</tr>
</tbody>
</table>

**RGB**

**NIR (850nm)**

**Object Classification**

Water

Oil

Unispectral internal and confidential. © Unispectral 2018
Multispectral fruits test: Real vs Plastic

Classification

Multispectral footprint

NIR (850)

Object Classification

Fake
Fake
Fake
RGB

Unispectral internal and confidential. © Unispectral 2018
Multispectral liquids test: Red wine / Vinegar / Coke / Soy sauce

Multispectral footprint

NIR (750 nm)

Object Classification
Multispectral fabrics test: Cotton vs Polyester

RGB

Multispectral footprint

Reflectance

Wavelength

713 736 759 782 805 828 851 874 897 920

Polyester

Cotton

Object Classification

NIR (850)

Unispectral internal and confidential. © Unispectral 2018
Multispectral seeds test: Peanut vs Watermelon vs Pistachio

Object Classification

RGB

NIR (805nm)

Object Segmentation

Object Classification
Multispectral test: Apple's quality inspection

RGB

NIR (850 nm)

False Colorization

Adaptive Threshold
Multispectral test: Leaves stress detection

Visible Light

Near Infra-Red Light (NDVI)

Healthy Plant
Stressed Plant
Thank You