Digital Imaging Basics & Scanning
FOR THE
LOUISiana Digital Library

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Basic Terminology

- **Pixels**
  - “Dots” arranged in columns and rows

- **Resolution**
  - Dots per inch (dpi)

- **Bit depth**
  - B/W, grayscale or color combinations

- **Dynamic Range**
  - Tonal differences
Example: Pixels
Example Resolution
### Example:
**Bit depth & Dynamic Range**

<table>
<thead>
<tr>
<th>Grayscale Bit Depth</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 bit</td>
<td>1</td>
<td>$2^1$</td>
<td>=</td>
<td>2 levels -- black or white</td>
</tr>
<tr>
<td>2 bit</td>
<td>10</td>
<td>$2^2$</td>
<td>=</td>
<td>4 levels -- black, white 2 grays</td>
</tr>
<tr>
<td>3 bit</td>
<td>101</td>
<td>$2^3$</td>
<td>=</td>
<td>8 levels -- black, white, 6 grays</td>
</tr>
<tr>
<td>4 bit</td>
<td>1010</td>
<td>$2^4$</td>
<td>=</td>
<td>16 levels -- black, white, 14 grays</td>
</tr>
<tr>
<td>8 bit</td>
<td>101010101</td>
<td>$2^8$</td>
<td>=</td>
<td>256 levels -- black, white, 254 grays</td>
</tr>
</tbody>
</table>

### Color Bit Depth

<table>
<thead>
<tr>
<th></th>
<th>Red</th>
<th>Green</th>
<th>Blue</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 bit</td>
<td>$2^2$</td>
<td>$2^2$</td>
<td>$2^2$</td>
<td>64 colors</td>
</tr>
<tr>
<td>8 bit</td>
<td>$2^4$</td>
<td>$2^4$</td>
<td>$2^4$</td>
<td>4096 colors</td>
</tr>
<tr>
<td>24 bit colors</td>
<td>$2^8$</td>
<td>$2^8$</td>
<td>$2^8$</td>
<td>16 million</td>
</tr>
</tbody>
</table>
Example:
Bit depth & Dynamic Range
Basic Terminology

- **File Size**
  - File Size MBs = height x width x bit depth x dpi² / 8 million bits
  - Example:
    \[
    (11\text{in} \times 17\text{in} \times 24\text{bit} \times 300^2) / 8 = (11 \times 17 \times 24 \times 90,000) / 8 = 51 \text{ megs}
    \]

- **Compression**
  - Lossless and Lossy

- **File Formats**
  - TIFF, JPEG, PDF, DOC, MrSid
Post Capture Processing
UnSharp Mask

Before UnSharp Mask

After UnSharp Mask of 150
Post Capture Processing

Histograms
LOUISiana Digital Library Standards

- Archival Master files
  - Recommend minimum 300 dpi resolution
  - Scaled 1:1
  - TIFF Format
- Display Image
- Thumbnail
- Custom Thumbnails
  - 72 dpi,
  - image scaled to 150 pixels wide
  - JPEG Format
Image Quality Metrics

- Resolution
- Color and tone
- Overall appearance
LOUISiana Digital Library Naming Conventions

- **Single Page Archival files**
  - oma_000001
  - oma_000002
  - oma_000003

- **Multiple Page Archival files**
  - **Item**  **Page**
    - oma_000001_00001
    - oma_000001_00002
    - oma_000001_00003
Scanning Collection Materials

- Benchmark Scanning

- Labor Intensive: get it right the first time!

- Sample Materials in Collection
  - BW Photographs
  - Color Photographs
  - Printed Text
  - Art Work
  - Newsprint
  - Manuscripts

- Establish Scan Settings Per Material
  - Write settings down for your student workers.