“Pulling a Matte” - Matte Creation

• From digitized images
  o Blue-screen matting (Petro Vlahos)
    ■ Separate blue background from foreground image
  o Video or chroma-keying
    ■ Range of chromaticities marked transparent
  o Image processing
    ■ Set of colors marked transparent, region growing ...
Pulling a Matte Using Blue Screening
Sportvision’s 1\textsuperscript{st}-and-10 line

- chroma-keys off green grass (or other colors)
- hard if uniforms match background (markings, snow,...)
- must track cameras, know shape of field (it’s not flat!)
Matte extraction is an active research area

- Natural Video Matting using Camera Arrays, N Joshi, W Matusik, S Avidan, Proc. SIGGRAPH 2006
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• From computer generated images
  o Coverage
  o Transparency
Porter-Duff Compositing Algebra

<table>
<thead>
<tr>
<th>Operation</th>
<th>$F_A$</th>
<th>$F_B$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>A over B</td>
<td>1</td>
<td>1-$\alpha_A$</td>
</tr>
<tr>
<td>B over A</td>
<td>1-$\alpha_B$</td>
<td>1</td>
</tr>
<tr>
<td>A in B</td>
<td>$\alpha_B$</td>
<td>0</td>
</tr>
<tr>
<td>B in A</td>
<td>0</td>
<td>$\alpha_A$</td>
</tr>
<tr>
<td>A out B</td>
<td>1-$\alpha_B$</td>
<td>0</td>
</tr>
<tr>
<td>B out A</td>
<td>0</td>
<td>1-$\alpha_A$</td>
</tr>
<tr>
<td>A atop B</td>
<td>$\alpha_B$</td>
<td>1-$\alpha_A$</td>
</tr>
<tr>
<td>B atop A</td>
<td>1-$\alpha_B$</td>
<td>$\alpha_A$</td>
</tr>
<tr>
<td>A xor B</td>
<td>1-$\alpha_B$</td>
<td>1-$\alpha_A$</td>
</tr>
</tbody>
</table>

$$C' = F_A C_A' + F_B C_B'$$

OpenGL blendfunction
Specify src and dst F’s

0, 1,
As, Ad, 1-As, 1-Ad,
min(As, 1-Ad),
Cs, Cd, 1-Cs, 1-Cd,
Painting – how are each of these strokes done?