Exercise 1 – Background Subtraction
Bluescreen / Greenscreen

http://www.theavclub.tv/behind_the_scenes/greenscreen/

http://www.iwatchstuff.com/images/2006/01/superman-greenscreen.jpg
Bluescreen

- Represent background with a single color value
  - Classification based on absolute distances
    
    $$| [r, g, b] - [ro, go, bo] | < t.$$
Bluescreen

- Represent background with a set of color values
  - Classify new RGB values based on Mahalanobis distance

\[
(x - \mu)^T \Sigma^{-1} (x - \mu) > t
\]

- Covariance Matrix

\[
\Sigma_{ij} = E [(X_i - \mu_i)(X_j - \mu_j)]
\]

- Estimation from n data points

\[
\frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})(x_i - \bar{x})^T
\]
Bluescreen
Pixelwise Color Model

- Mean and covariance for each pixel
- One threshold for all pixels (Mahalanobis distance)
Pixelwise Color Model
Matlab

• Many loops and if statements can be avoided
  – $A \cdot B$
  – Mask = $A > t$
  – $A(:,1)$, $A(:,1)$

• Accessing images from a movie
  – mov = aviread(‘bluescreen.avi’);
  – im = mov(frameNo).cdata

• Exercise sheet

• Matlab help