Color-based object detection & image segmentation

Michael C. Nechyba

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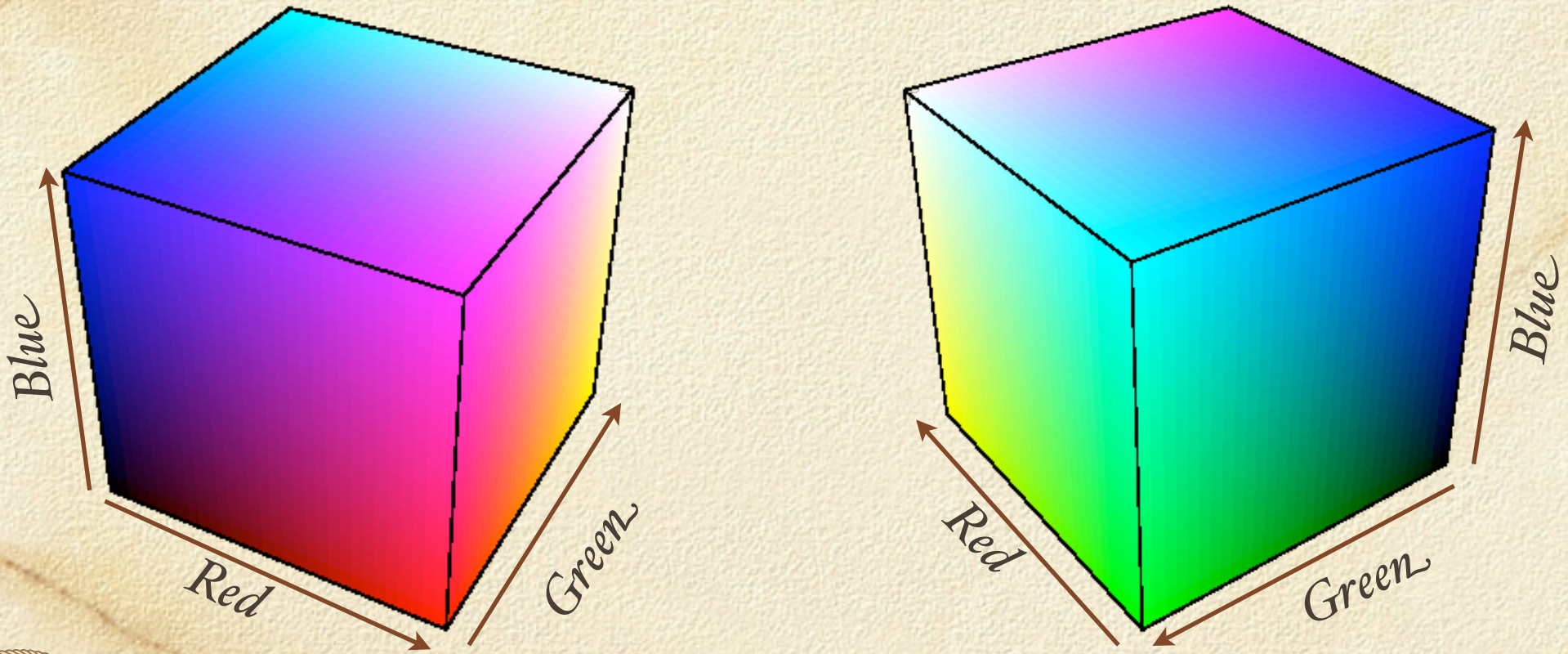
Outline

- Feature space (RGB color)
- Object (ball) detection
- Image segmentation (path detetion)
- C source code on w/sample files on web

Color representation

RGB color cube

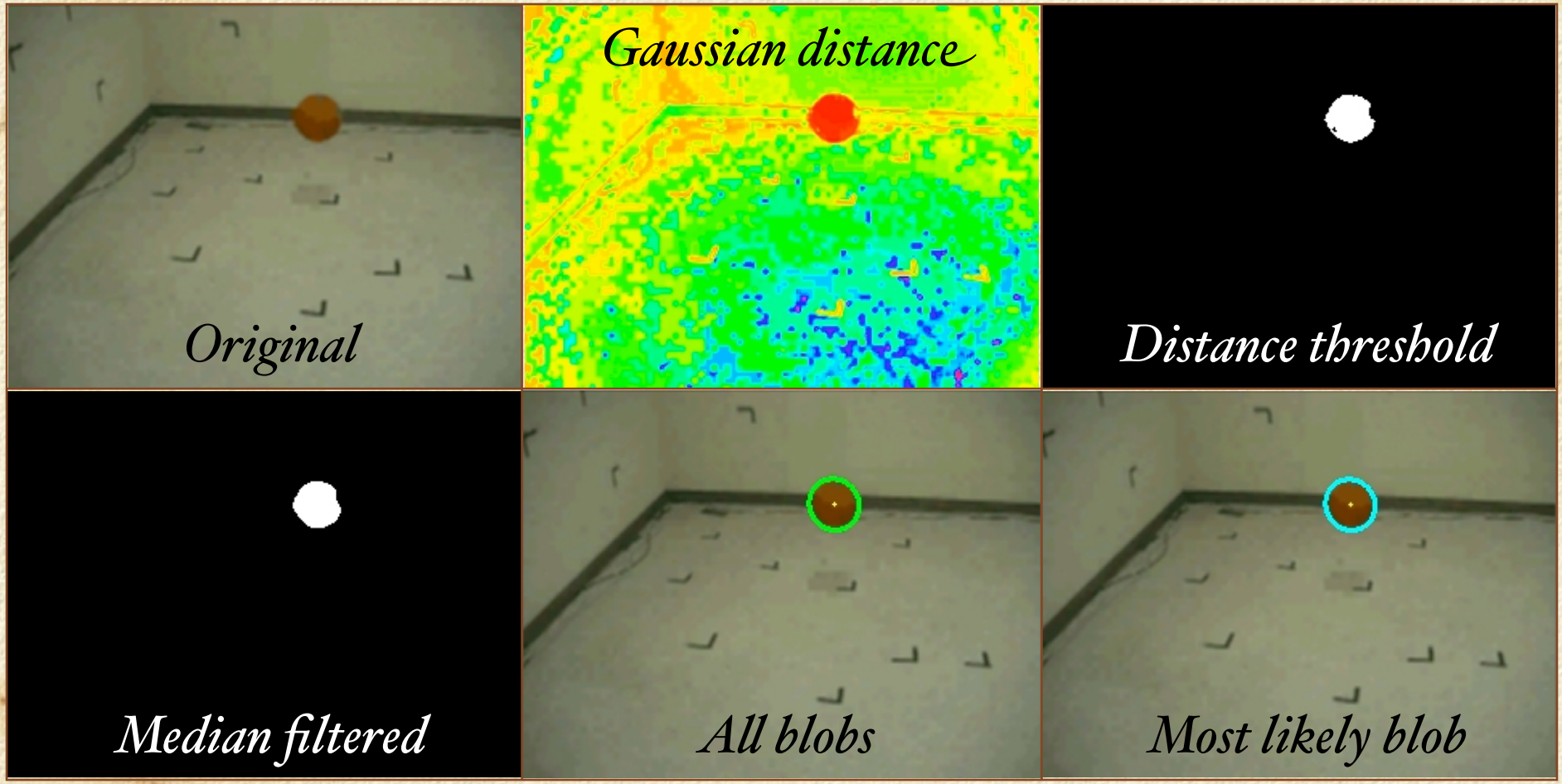


Each pixel is represented as a 3-byte value (RGB)

Object detection/ segmentation

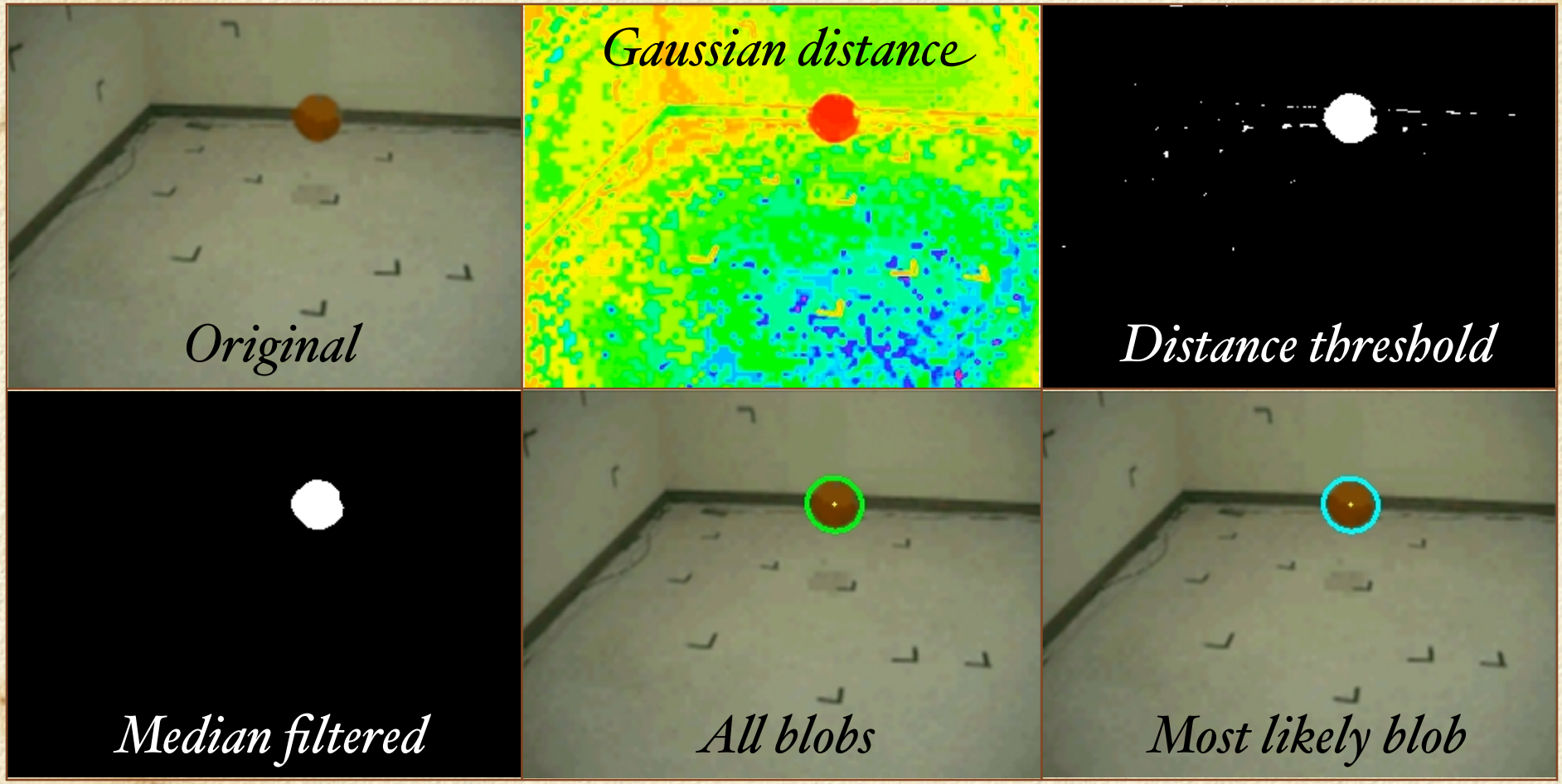
- Extract relevant *features* for object of interest (color in our case)
- Build *statistical model* of feature distribution for object:
  - Simplest statistical model: Gaussian
  - Over color space: 3D Gaussian
- For unknown pixel, use *distance threshold* from statistical model

Clean object detection



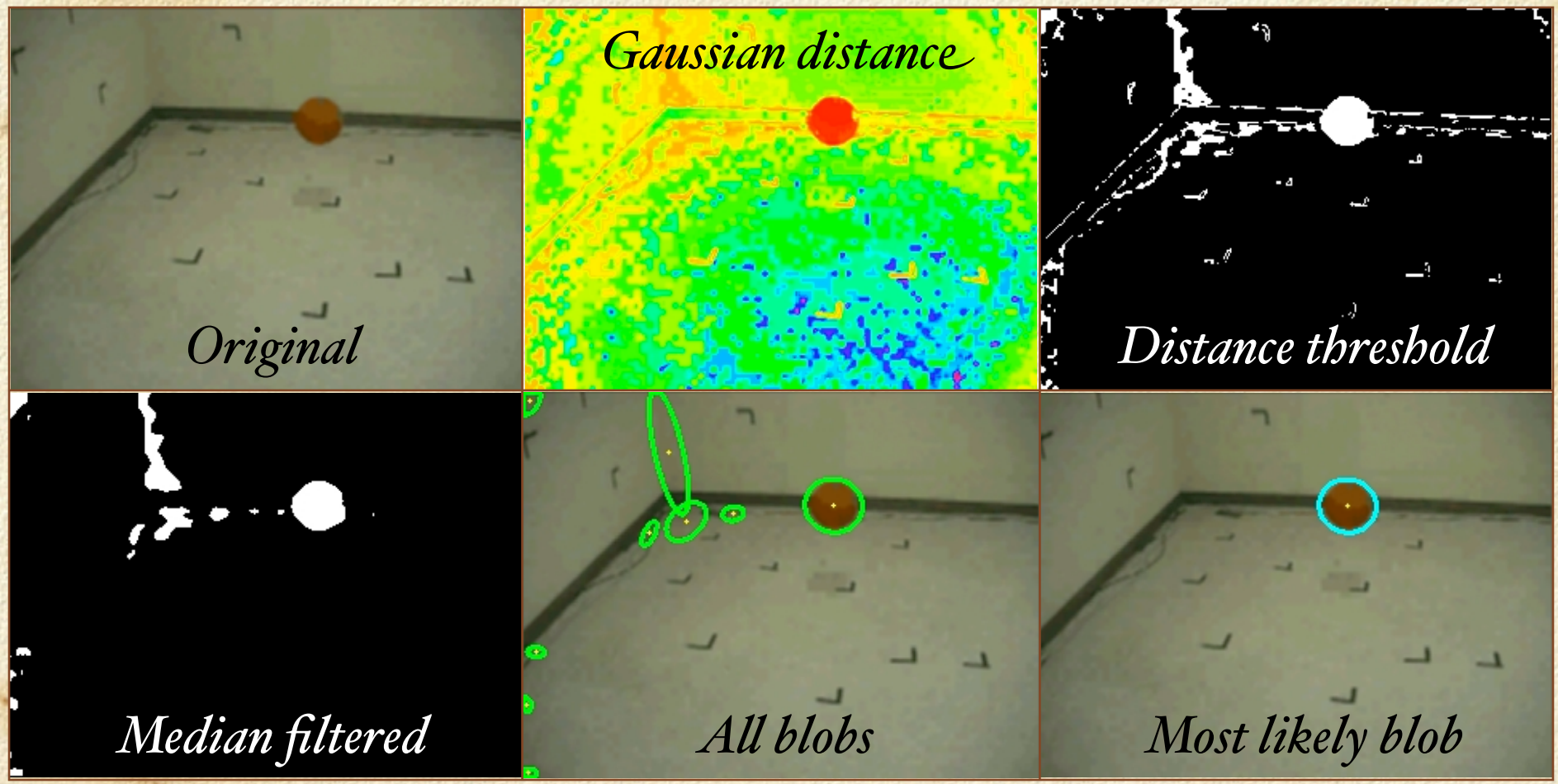
Gaussian training image

Distance threshold slightly too high...



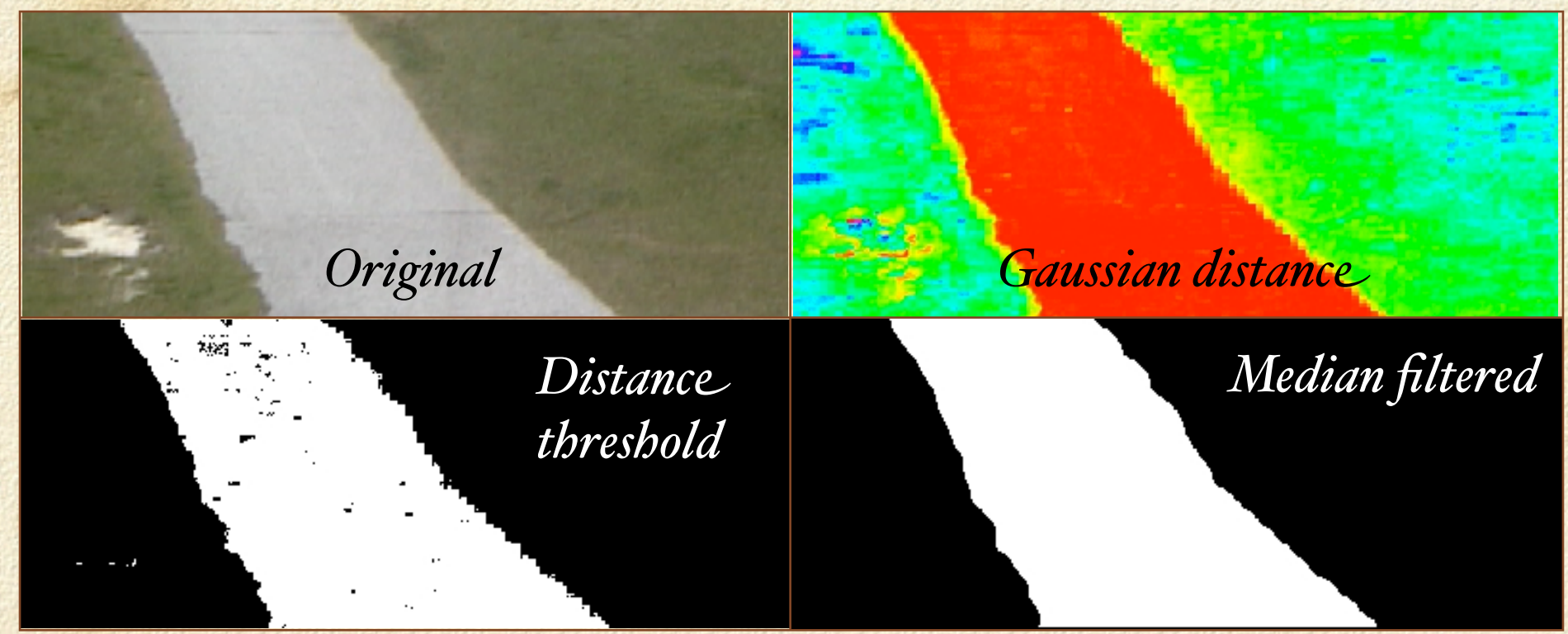
Gaussian training image

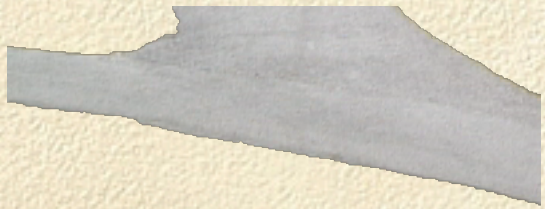
Distance threshold way too high...



Gaussian training image

Path segmentation example





Gaussian training image

Sample code available

- Stand alone C application:
  - `http://mil.ufl.edu/~nechyba/eel6825/source_code.html`
- Unix/Linux/MacOS X
  - Also MSWindows w/X-server software
- Examples:
  - Object detection/localization
  - Path identification

GATOR Engineering
UNIVERSITY OF FLORIDA