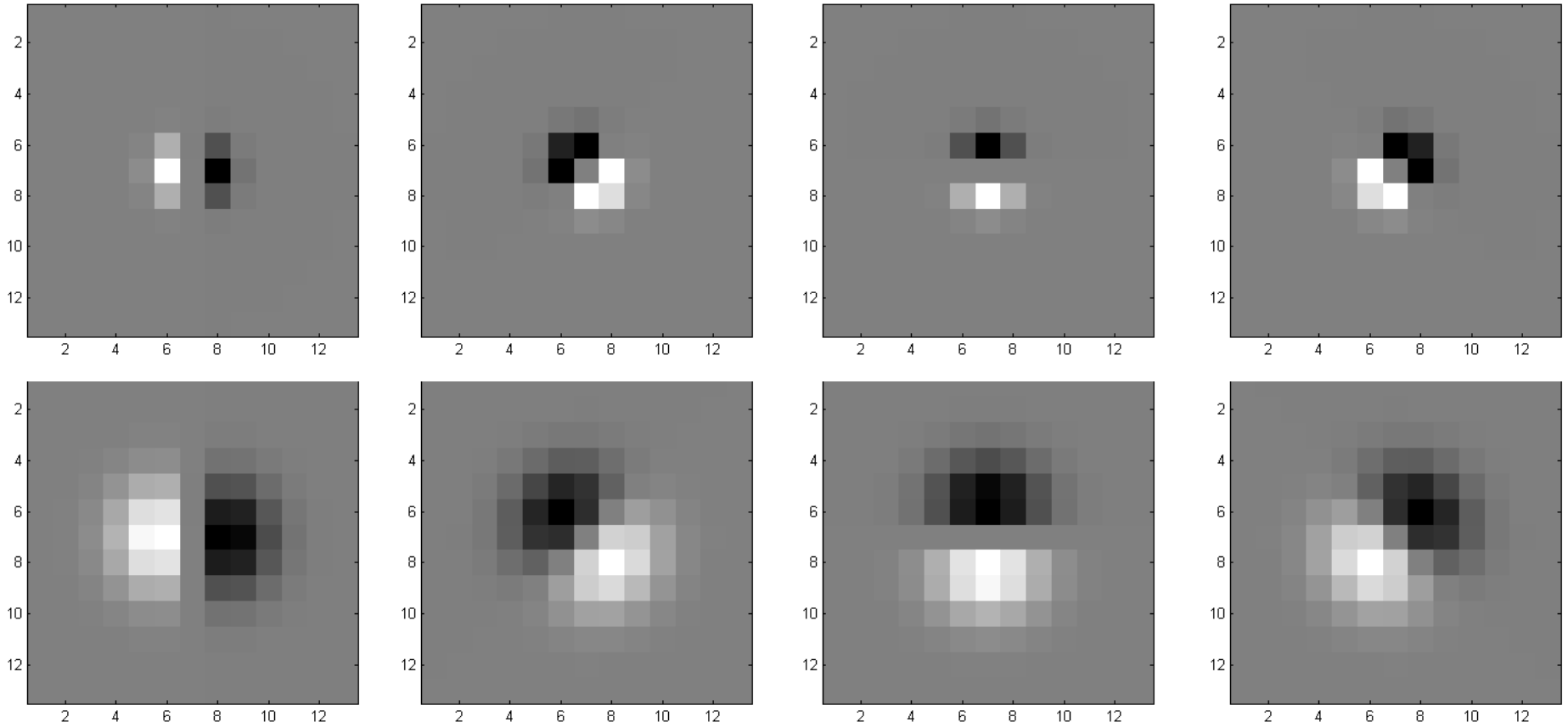
Project Presentation – Week 2

By: Joshua Michalczak, 28 May 2010
For: Computer Vision R.E.U. at University of Central Florida

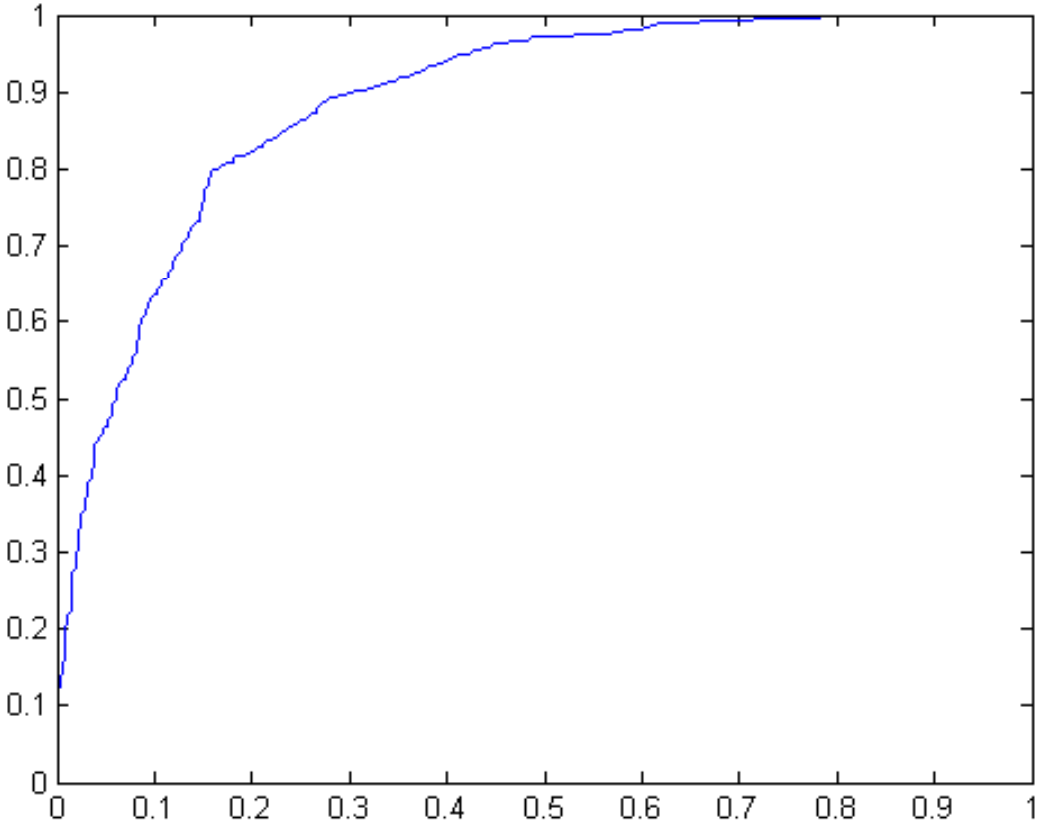
Learned Edge Detection - Filters



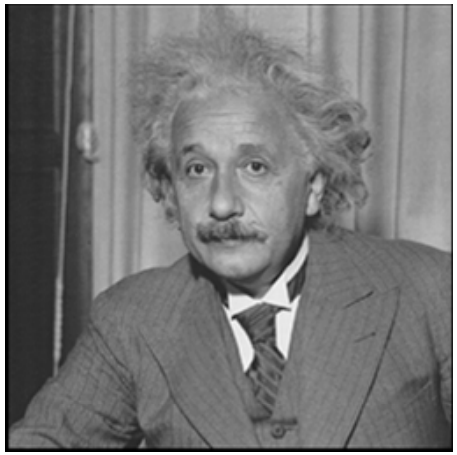
Learned Edge Detection - RoC

- False alarm = 10%,
  Detection = 63.5%,
  Threshold = ~62.0%

- False alarm = 30.3%,
  Detection = 90%,
  Threshold = ~32.6%



Learned Edge Detection



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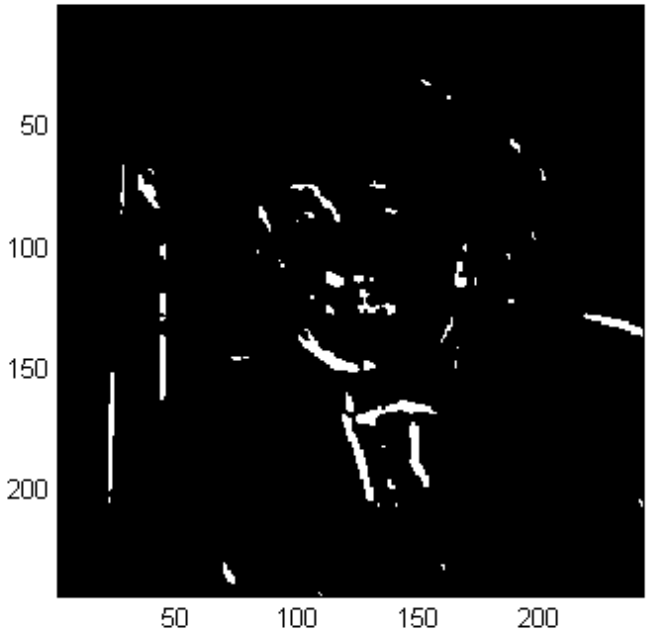

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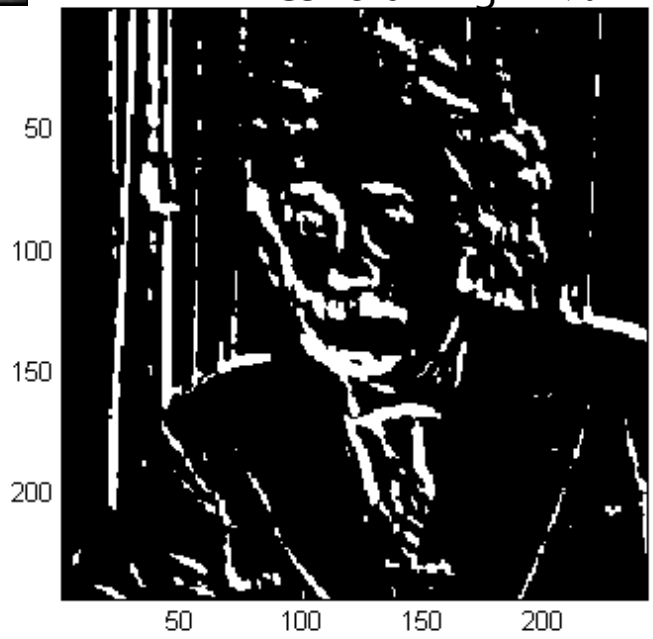
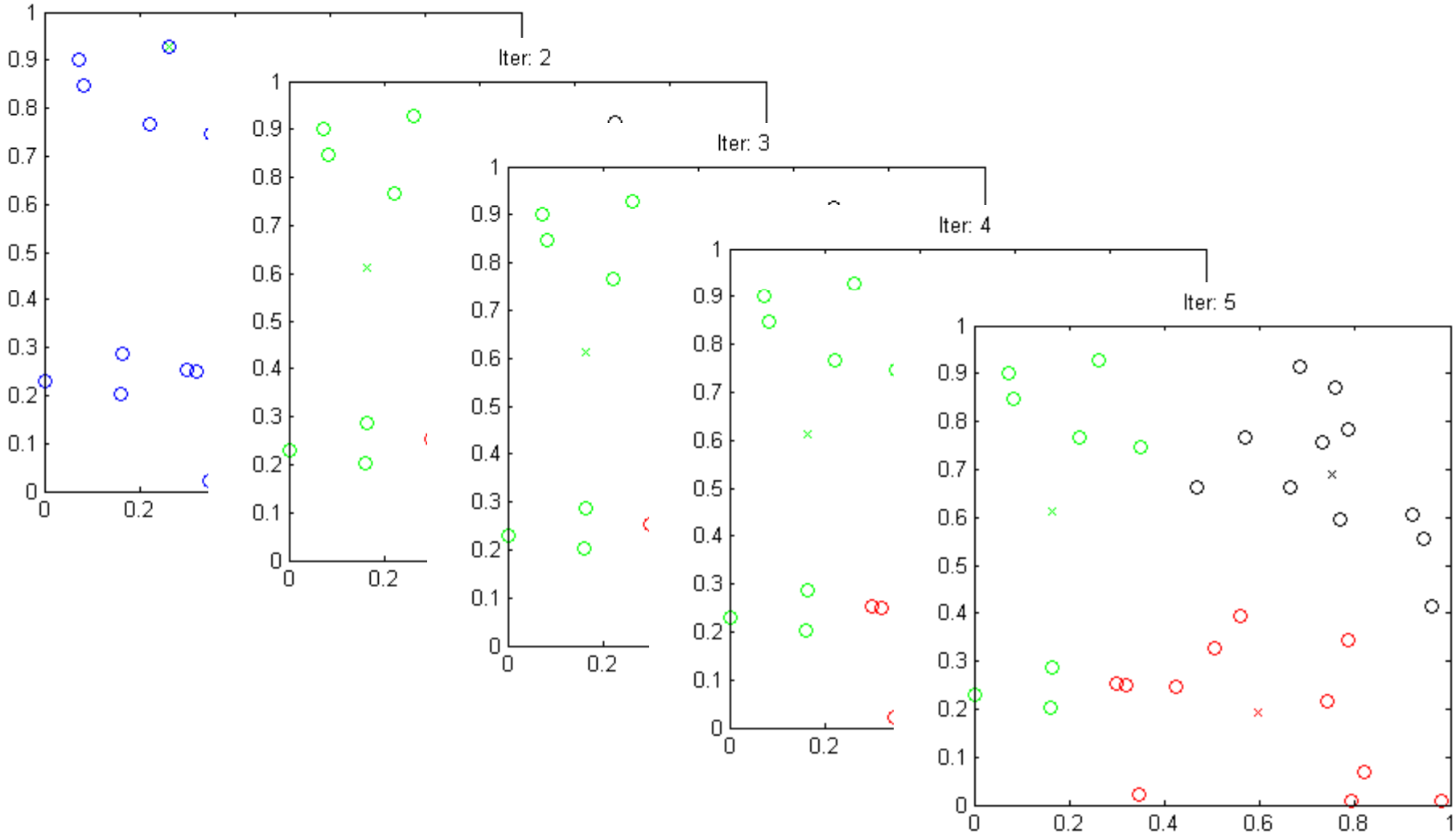
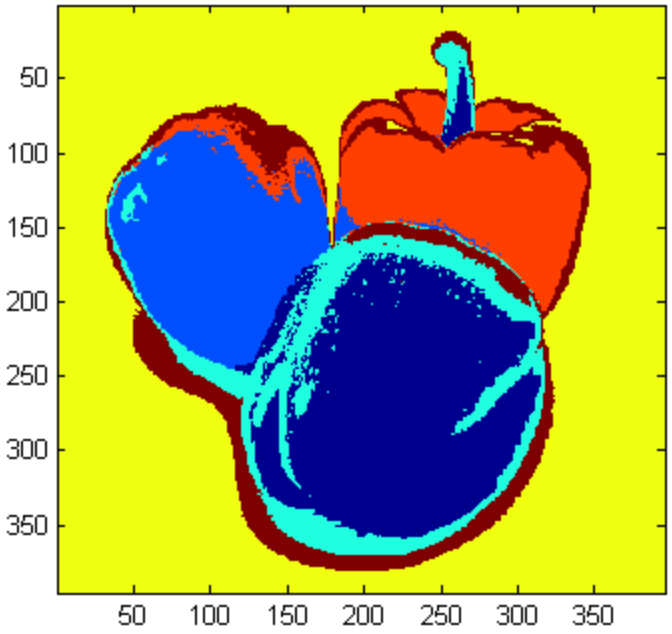


Clustering via *K*-Means



Clustering via *K*-Means

6 cluster centers,
without location weight



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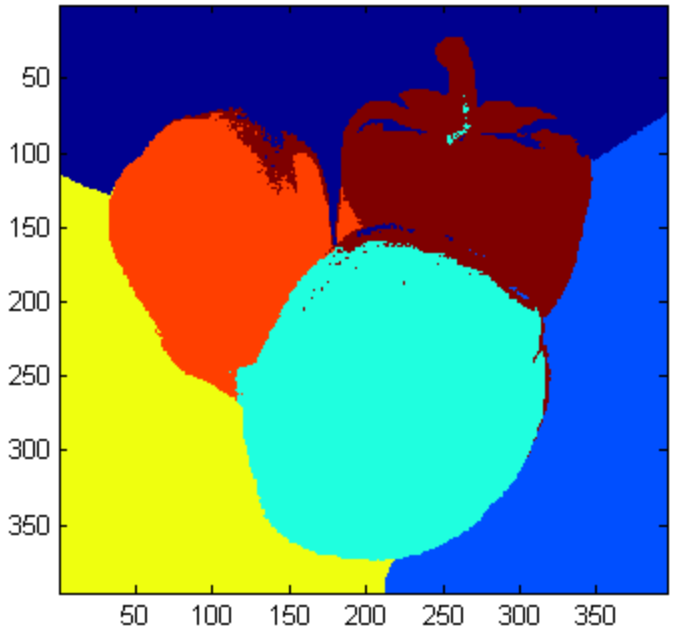
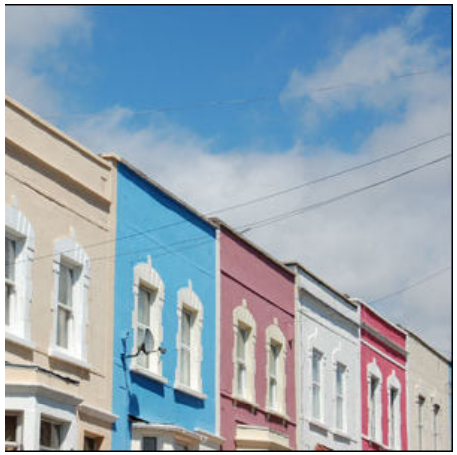
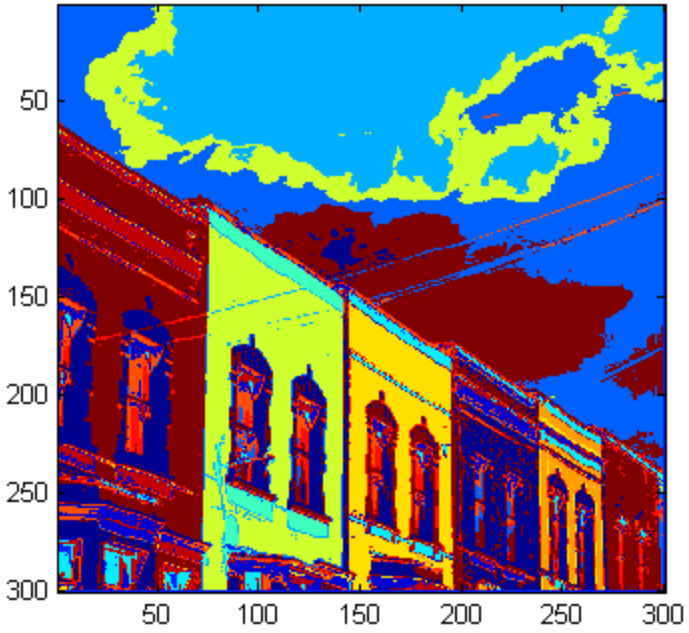


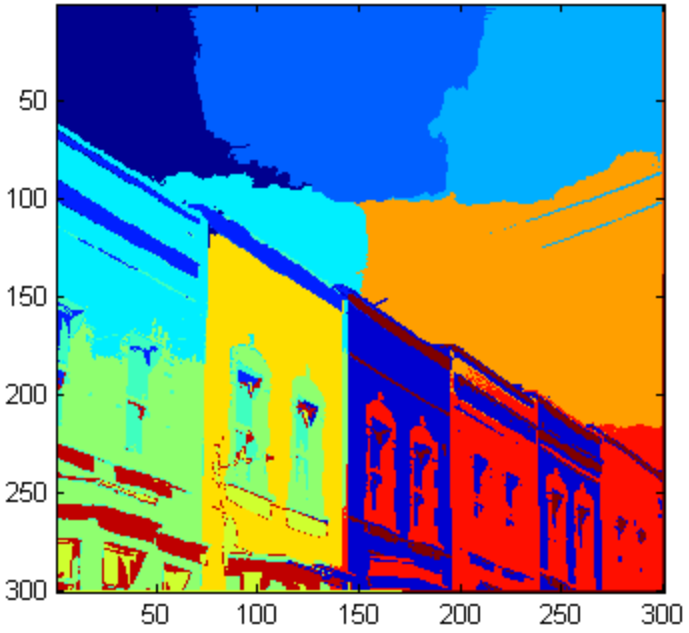
Clustering via *K*-Means



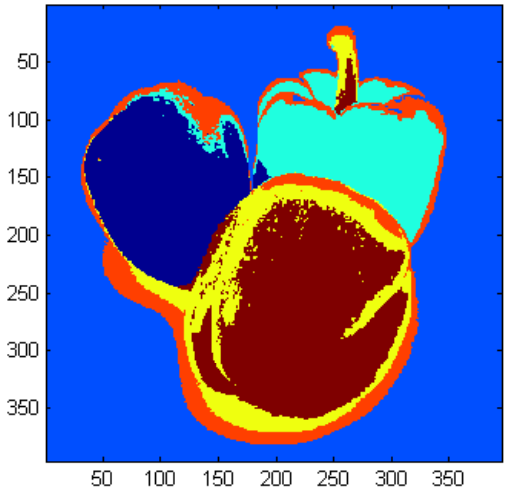
15 cluster centers,
without location weight



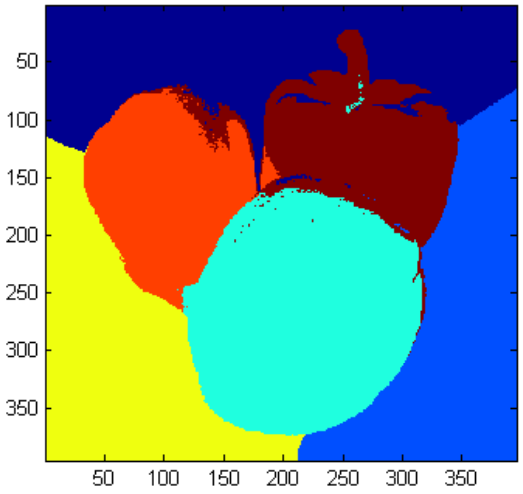
15 cluster centers,
with location weight



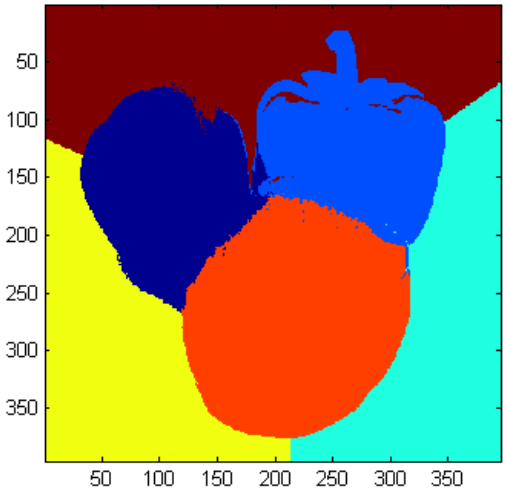
Clustering via *K*-Means (Color weight vs. Location weight)



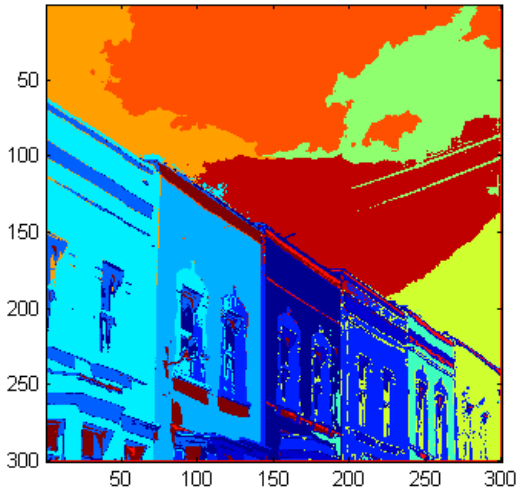
Higher color weight

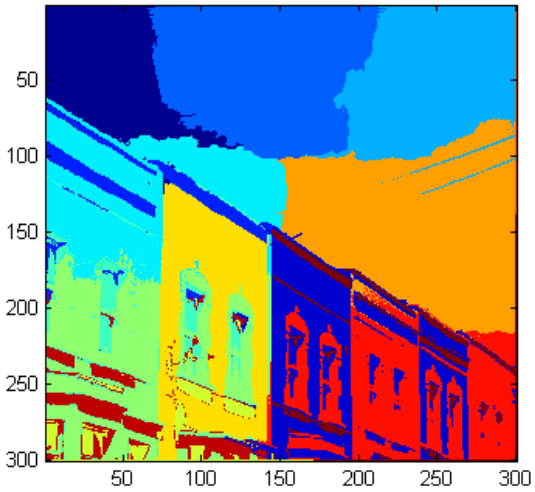


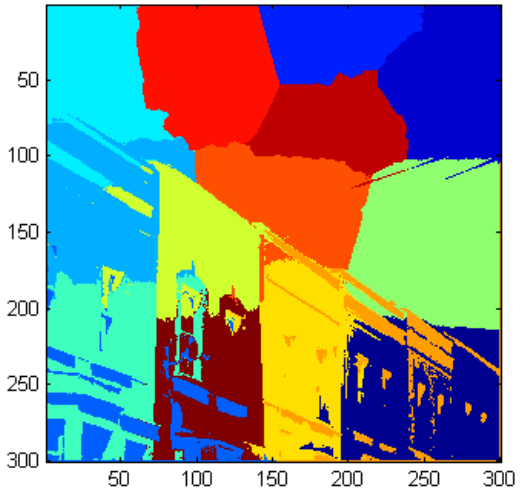
Equal weights



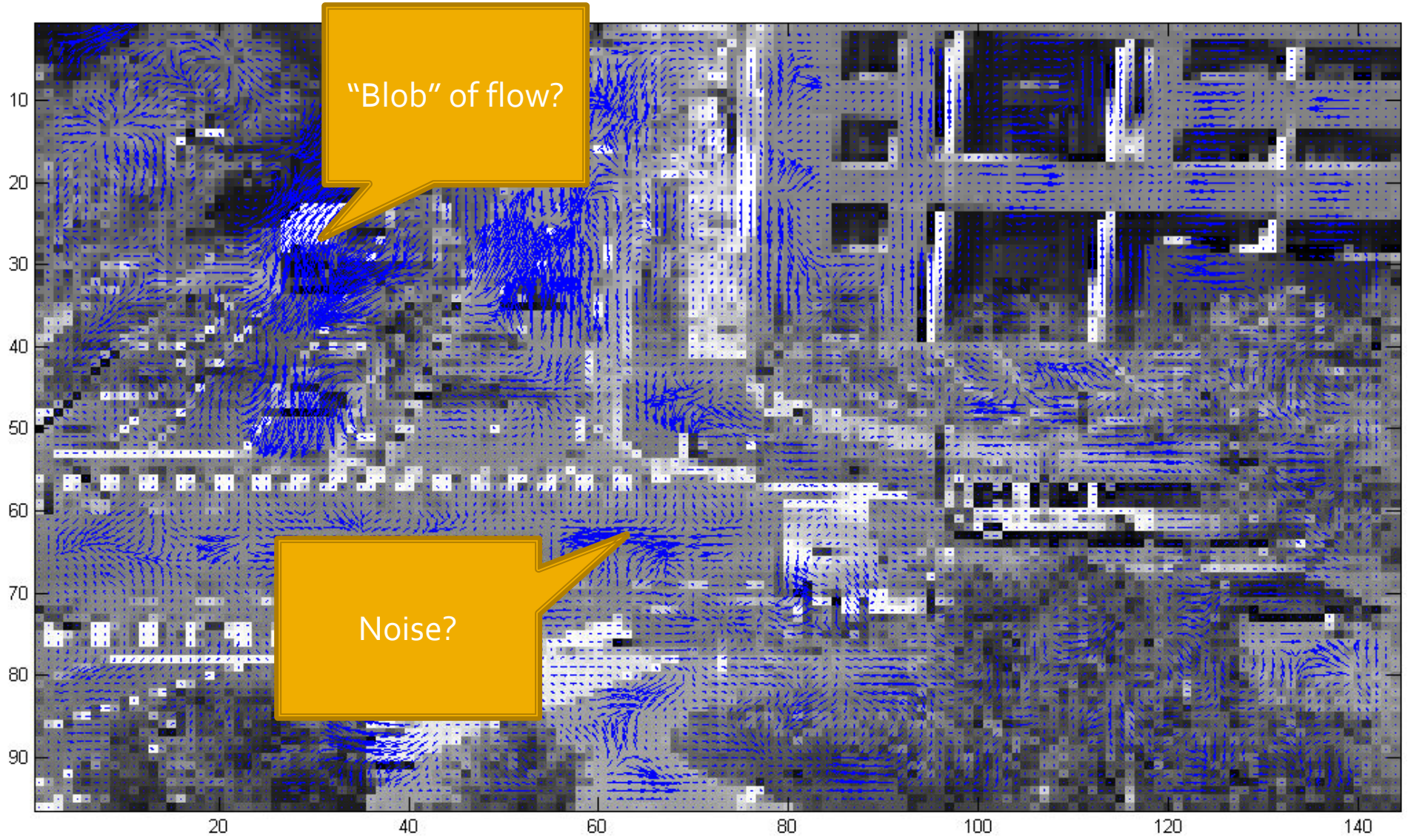
Higher location weights



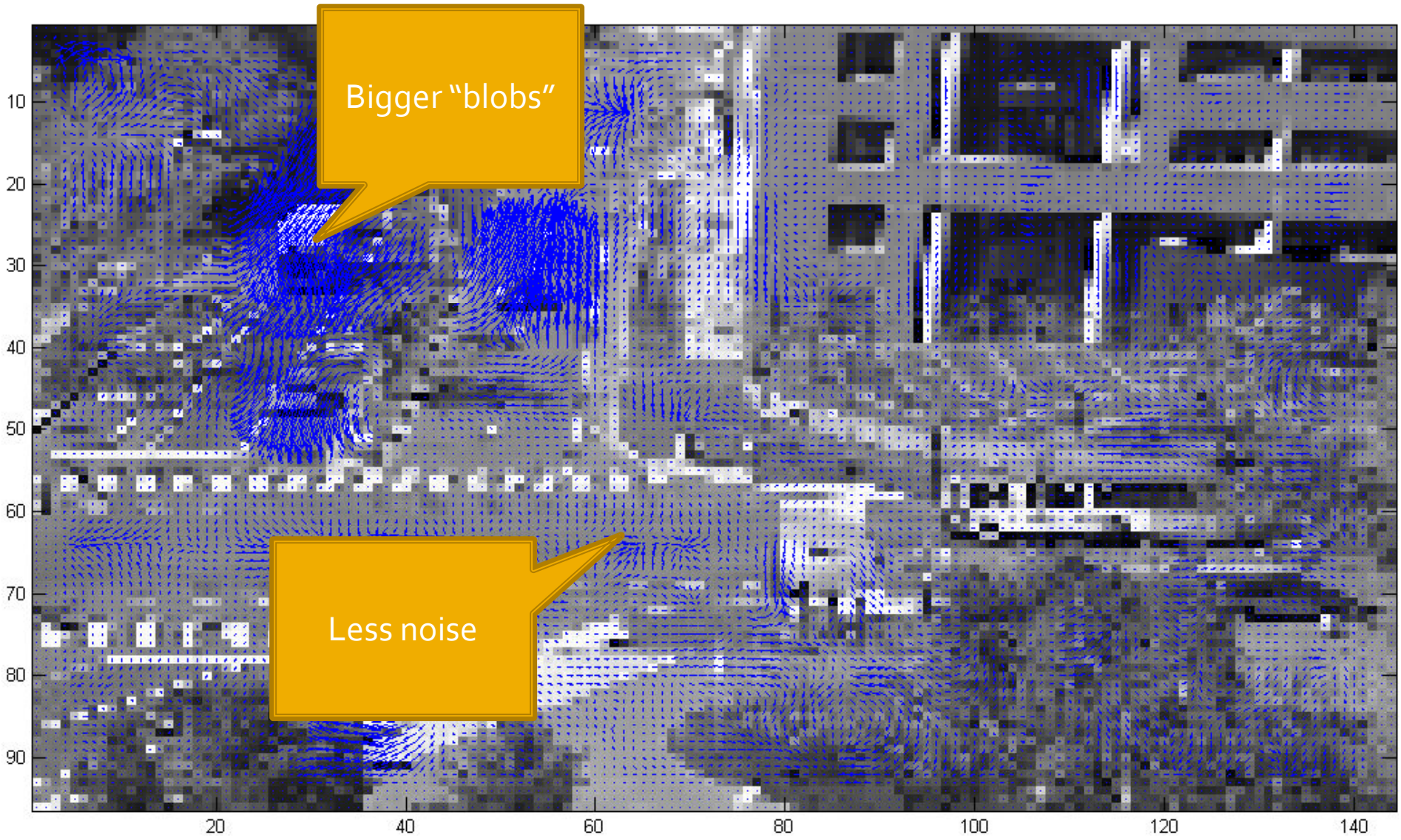




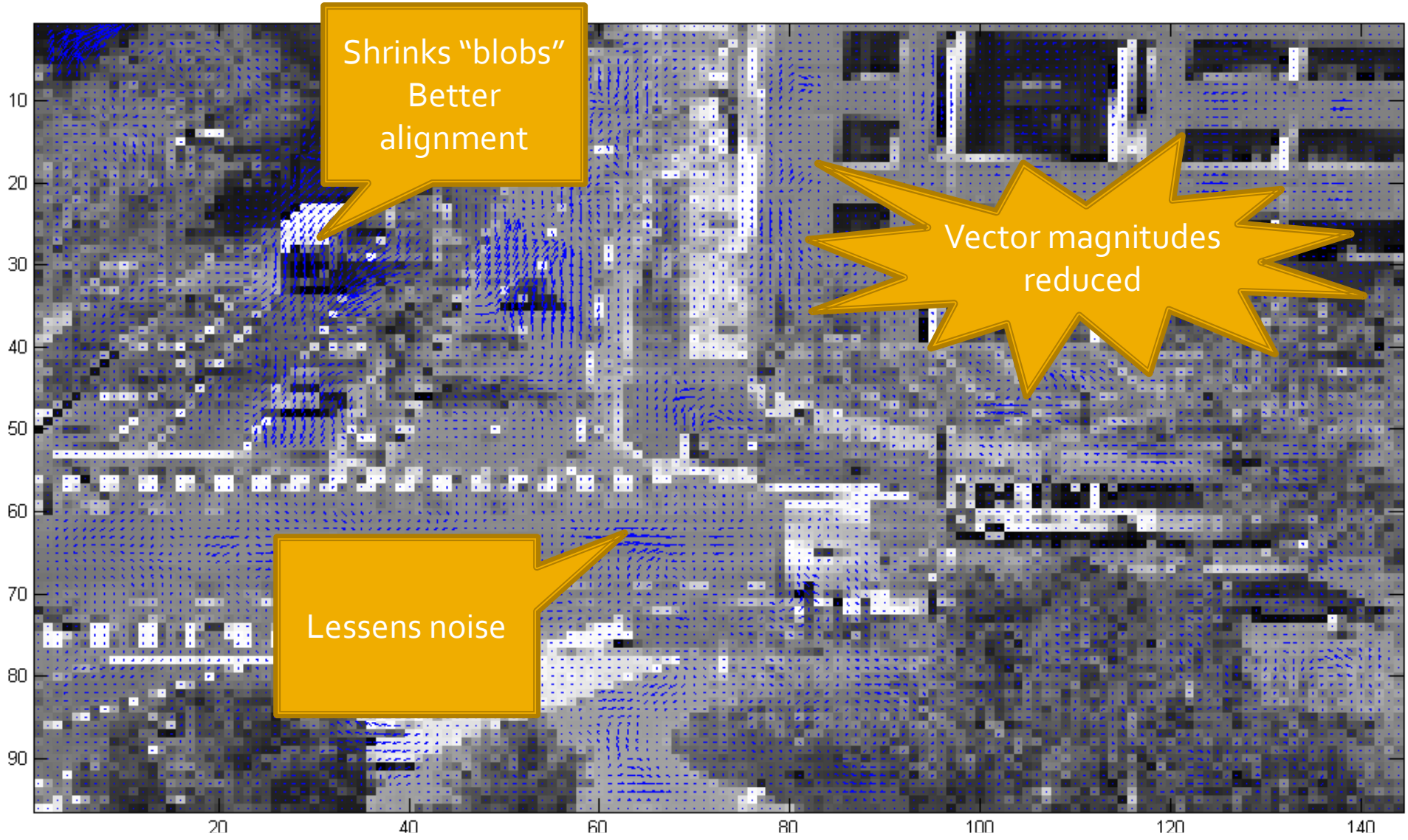
Optical Flow Results - Initial (levels: 3, win: 3, iter:3)



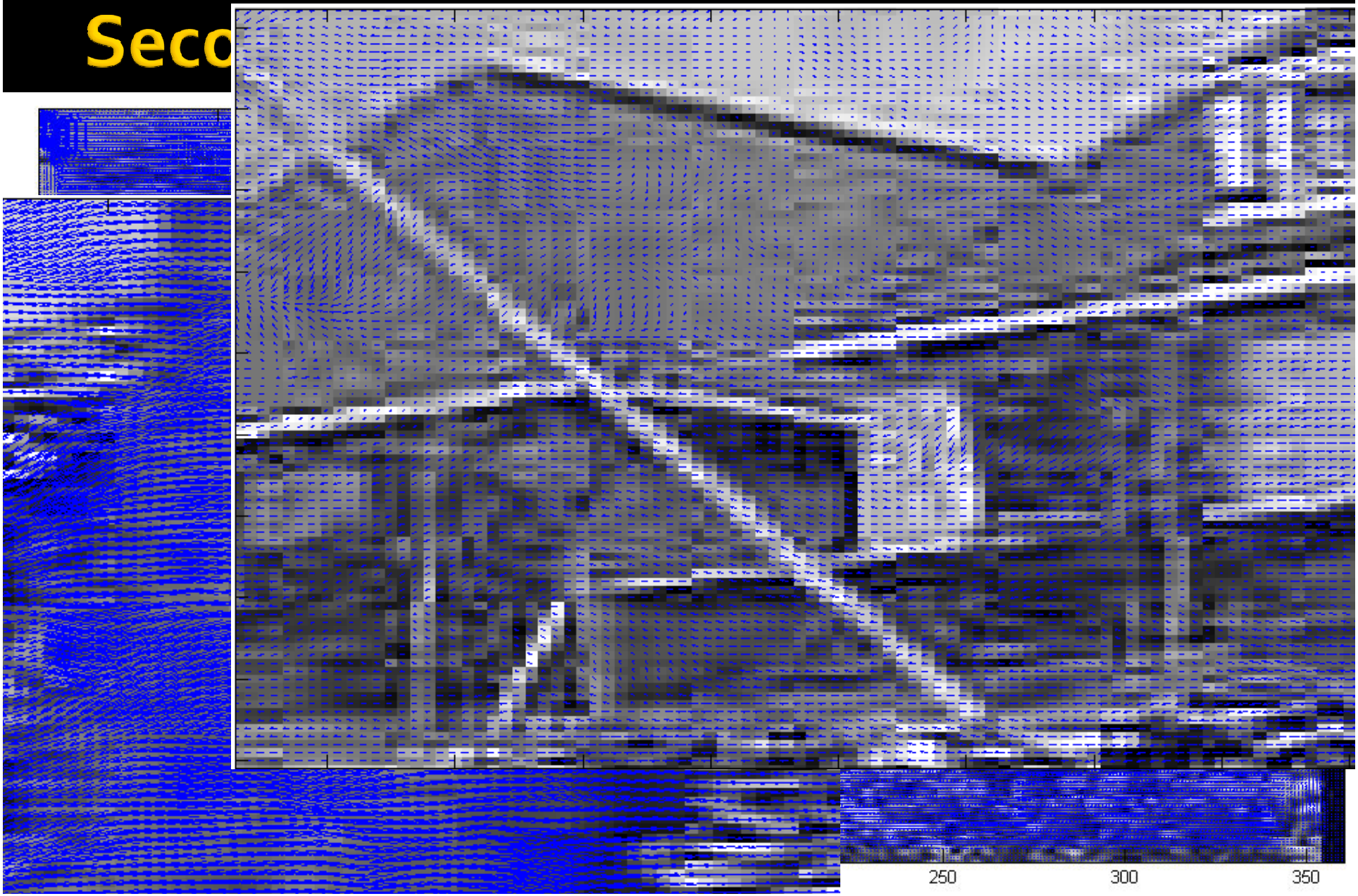
Optical Flow Results – Larger Win (levels: 3, win: 5, iter:3)



Optical Flow Results – More iter (levels: 3, win: 3, iter:20)



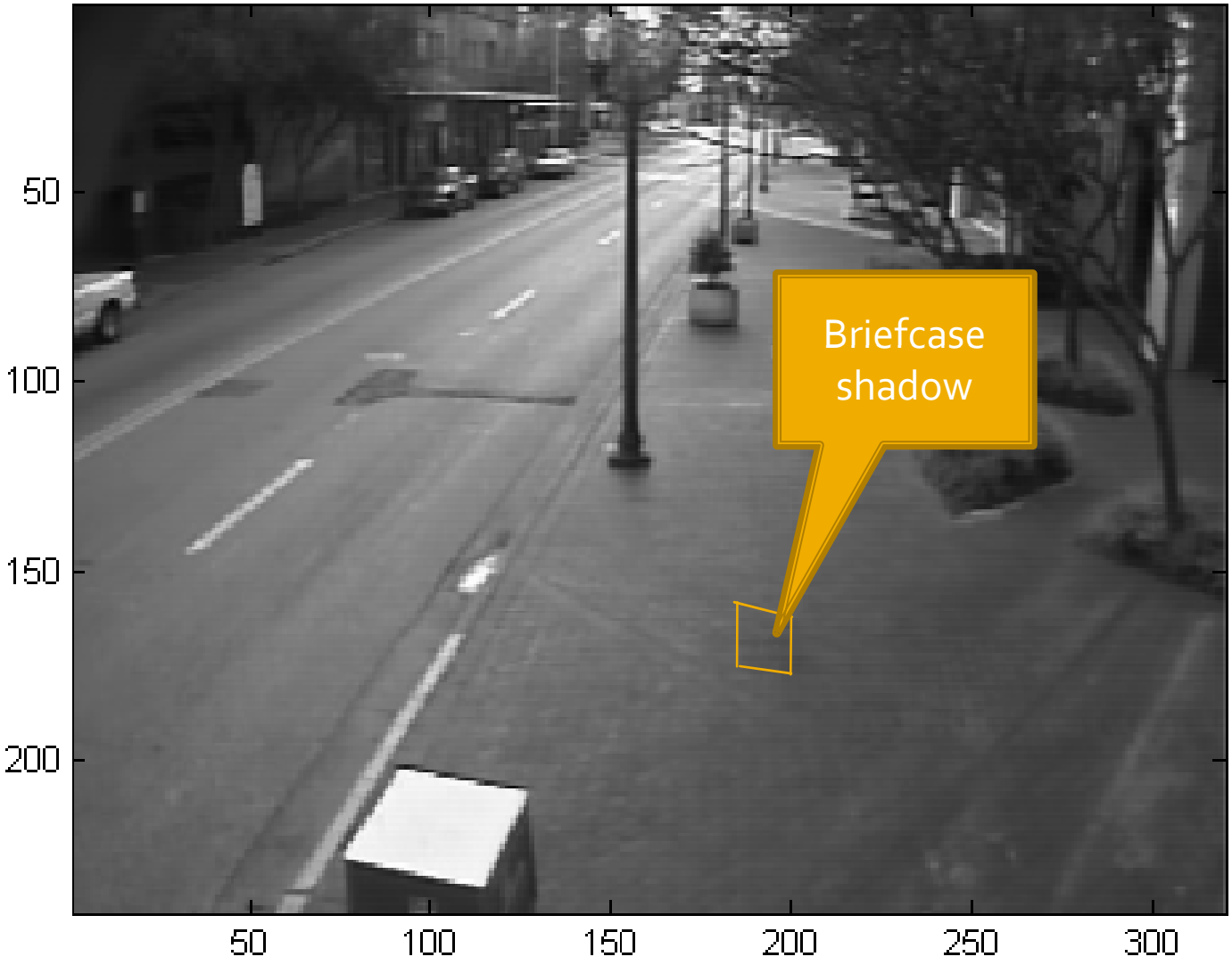
Optical Flow Results – Seco



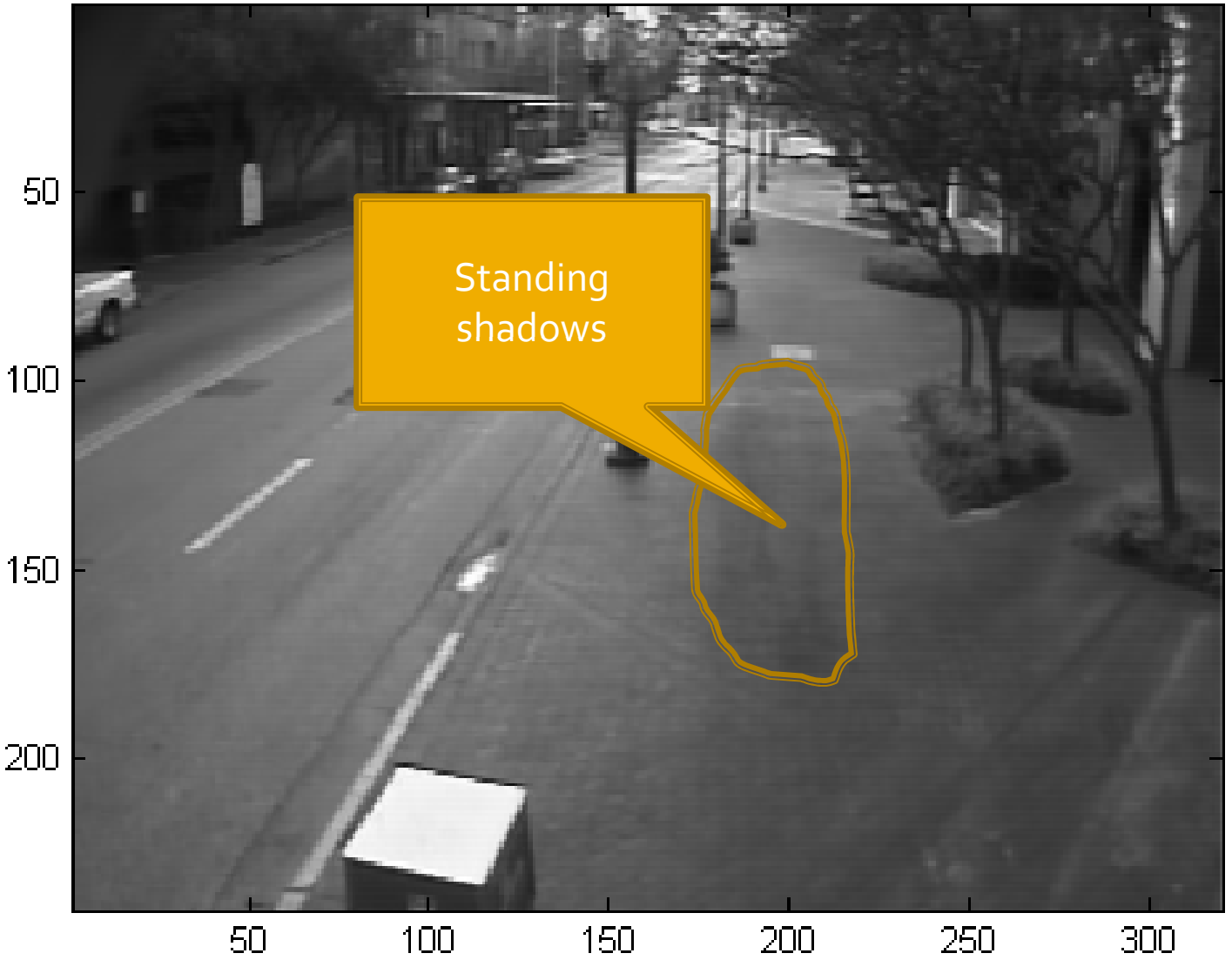
Optical Flow Results - Thoughts

- Larger windows
  - Reduce noise (+)
  - Increase "blob" size (-)
- More iterations
  - "blobs" better modeled (+)
  - Computationally expensive (-)
  - Changes vector magnitudes (More accurate?)
- Levels
  - Each scene/scenario seems to have an ideal pyramid count.
  - Inappropriate level size greatly affects the resulting flow adversely.

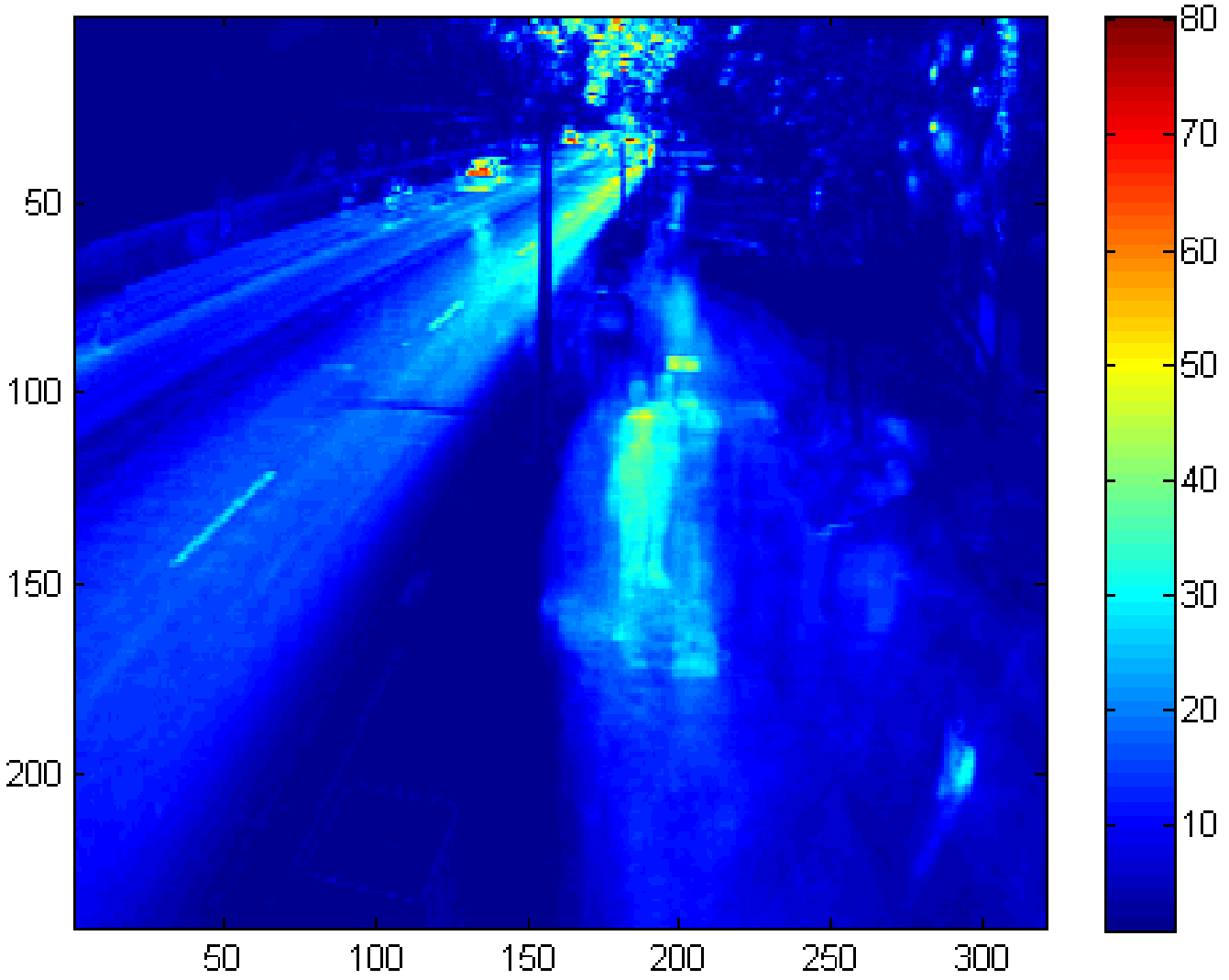
Background Subtraction - Median



Background Subtraction – Single Gaussian



Background Subtraction – Standard Deviation



Background Subtraction – Comparing Results

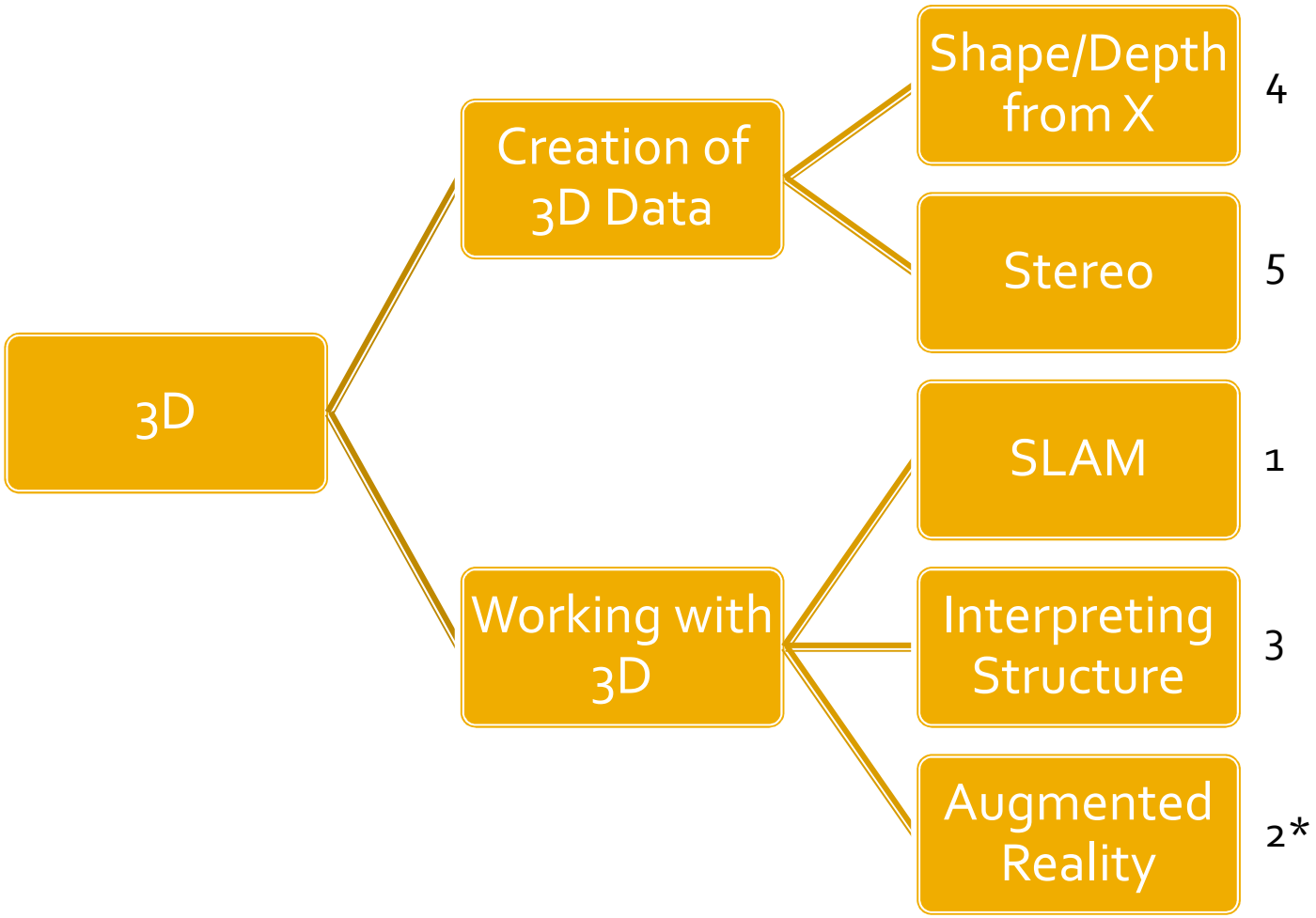
Median
(10 dist.)

Frame 152

Frame 670

Gaussian
(-2 < z > 2)

Topics I'm Interested in



SLAM - Simultaneous localization and mapping

- Likes: Problem well defined
  - Plethora of research – good ideas and algorithms
  - Could be coupled with machine learning for other tasks?
- Idea: Could aide in the accuracy of Dr. Lobo's 4-camera device? Extend uses in market?
  - When coupled together, localization and mapping correct errors in each-other.

Augmented Reality

- Likes: Combining 3D interpretation with applications
- Dislikes: Seems to have moved away from research and more into application fields
  - Most papers were system specific or discussed a use of AR rather than AR itself
- Idea: Coupling "Where am I" with AR
  - Sort of already done though, see Layar app for Android phones

Interpreting Structure

- Likes: Couples 3D field with Machine Learning field
  - Useful base for other work; see Depth-map To Skeleton project
- Dislikes: Too broad of a problem
  - Would prefer focused project to ensure good results from REU program
  - Also, not sure of project ideas other than DTS project….

Creation of 3D Data

- Likes: Low-level
  - I tend to gravitate to "fundamental problems"
  - Again, building a framework for other work
- Dislikes: Dead field?
  - Most techniques are well researched
  - New technology automagically grabs reliant depth; stereo and 3D cameras
  - Again, not sure on project topics other than depth from defocus