Shot Boundary Experiments at The University of Iowa

David Eichmann[1,2] & Dong-Jun Park[2]

[1]School of Library and Information Science

[2]Computer Science Department

Basic Assumptions

- A relatively small number of ‘basic’ metrics can be composed into a metric that can perform well
  - Observed with ASR (e.g., Rover)
- For this year, focus on localized video measures
  - i.e., contiguous pairs of frames

Basic Metrics

- Color Histogram Similarity
  - pixels compressed to a 9-bit color scheme, yielding a 512-bin histogram
- Frame Color Distance
  - scale frames to 60 x 60 thumbnails and then average the color space distance of all pixel pairs
- Frame Edge Distance
  - generate an edge representation of frames and then the percentage of entry and exit edges

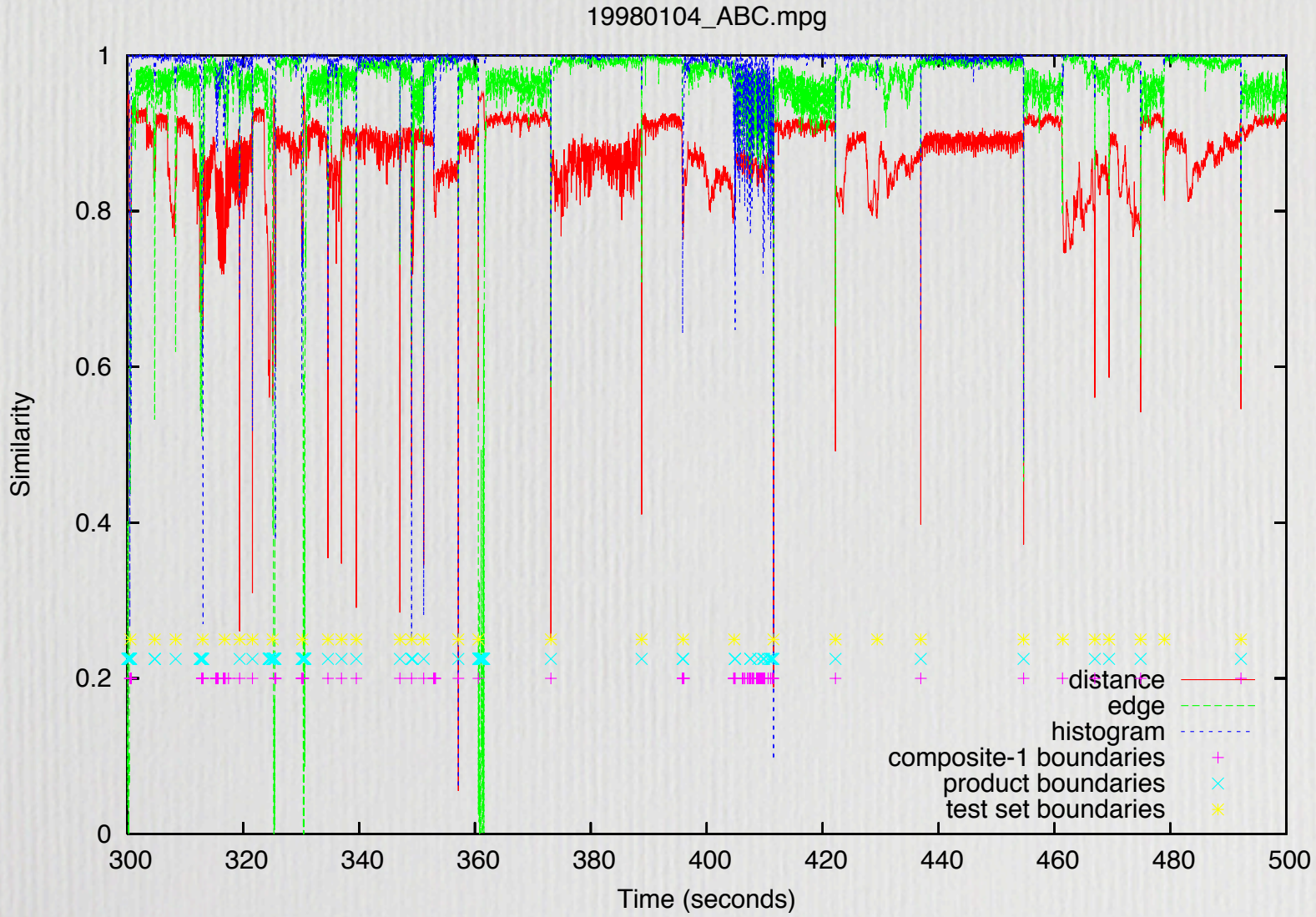
A Sample Image

A Sample Image

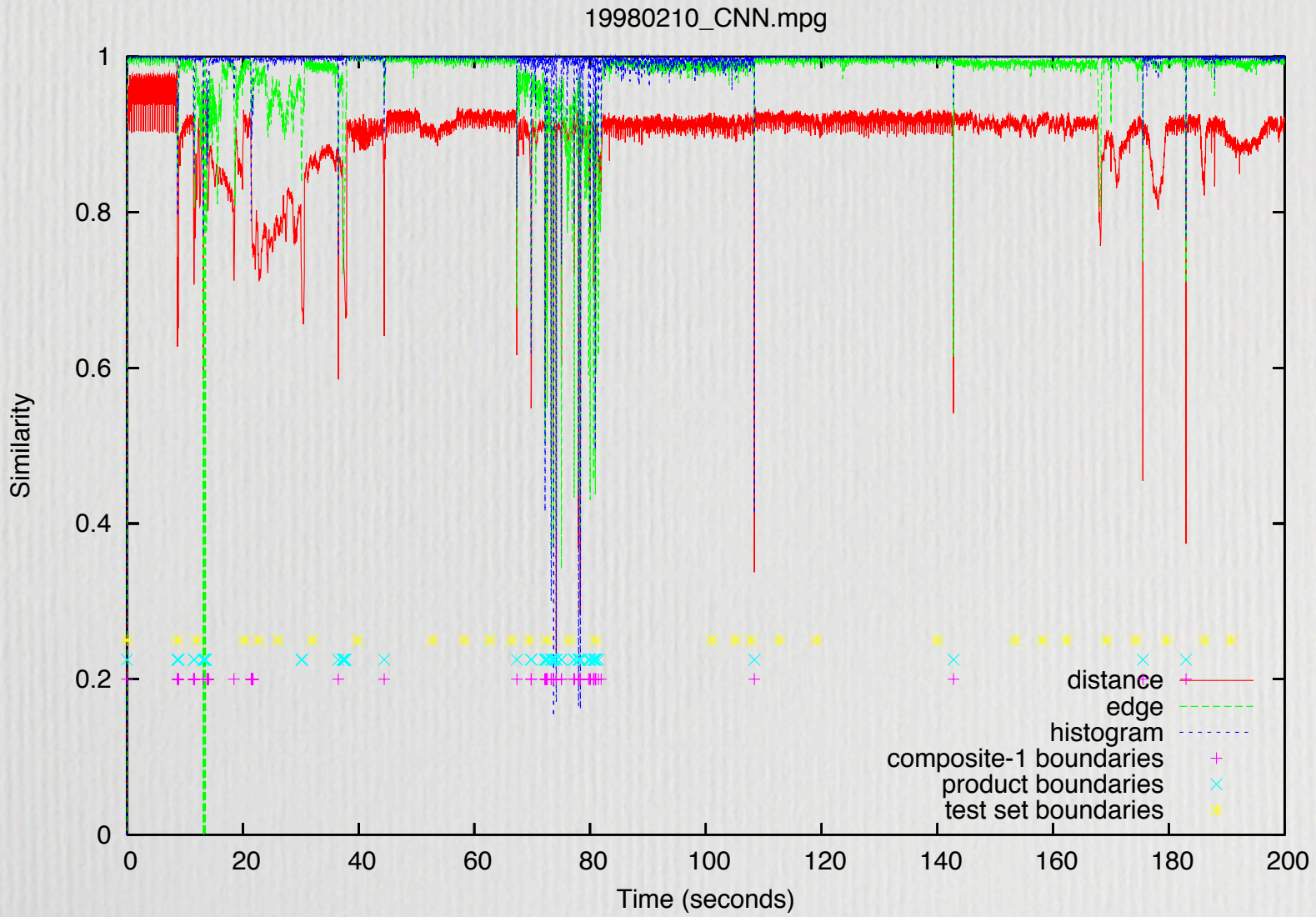
Composite Metrics

- Boolean Predicate of Basic Metrics
  - Composite-1: h < 0.95 & (d < 0.80 | e < 0.85)
  - Composite-2: (h < 0.82 & d < 0.82)
    | (h < 0.79 & e < 0.79)
- Product of Basic Metrics
  - d * e * h < 0.60

Tuning / Visualization



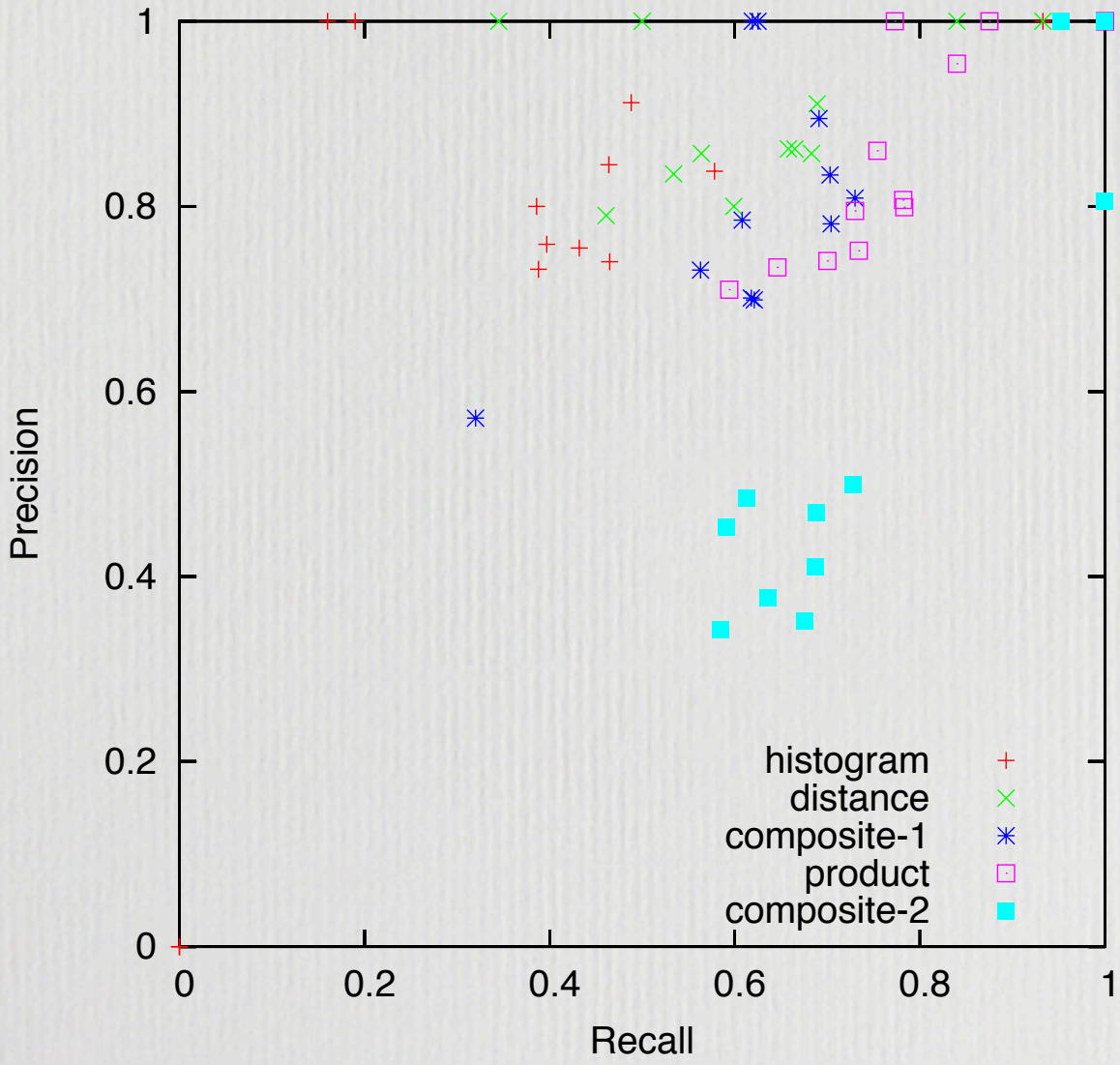
Tuning / Visualization



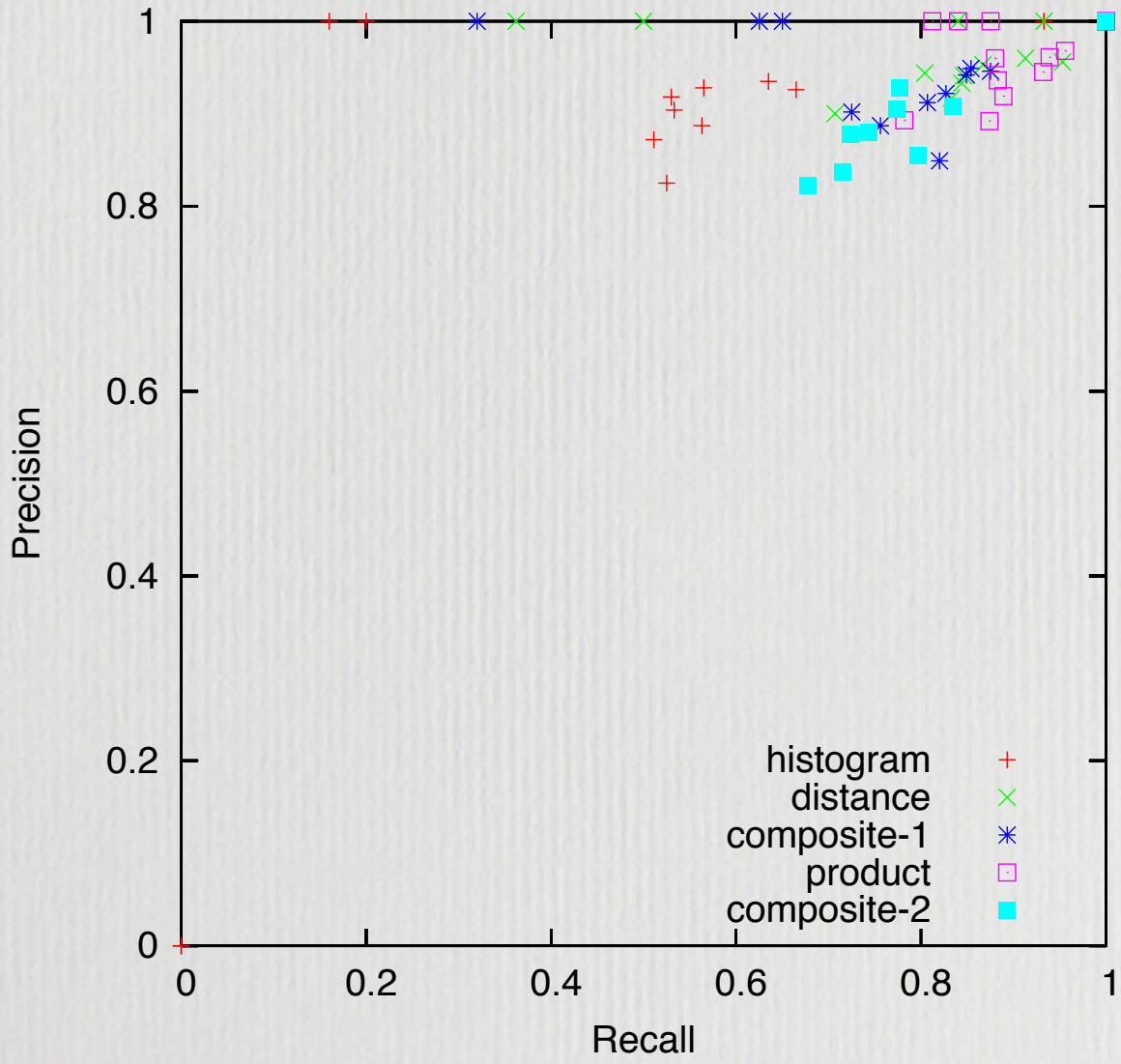
Official Runs

Run	Metric	All		Cuts		Gradual			
		Rec	Prec	Rec	Prec	Rec	Prec	F-Rec	F-Prec
UIowaSB0301	histo.	0.445	0.804	0.554	0.937	0.178	0.389	0.234	0.960
UIowaSB0302	dist.	0.607	0.855	0.835	0.963	0.051	0.158	0.178	0.826
UIowaSB0303	comp-1	0.657	0.785	0.810	0.948	0.285	0.360	0.274	0.907
UIowaSB0304	prod.	0.722	0.785	0.893	0.976	0.306	0.330	0.300	0.938
UIowaSB0305	comp-2	0.665	0.432	0.772	0.957	0.406	0.123	0.286	0.777

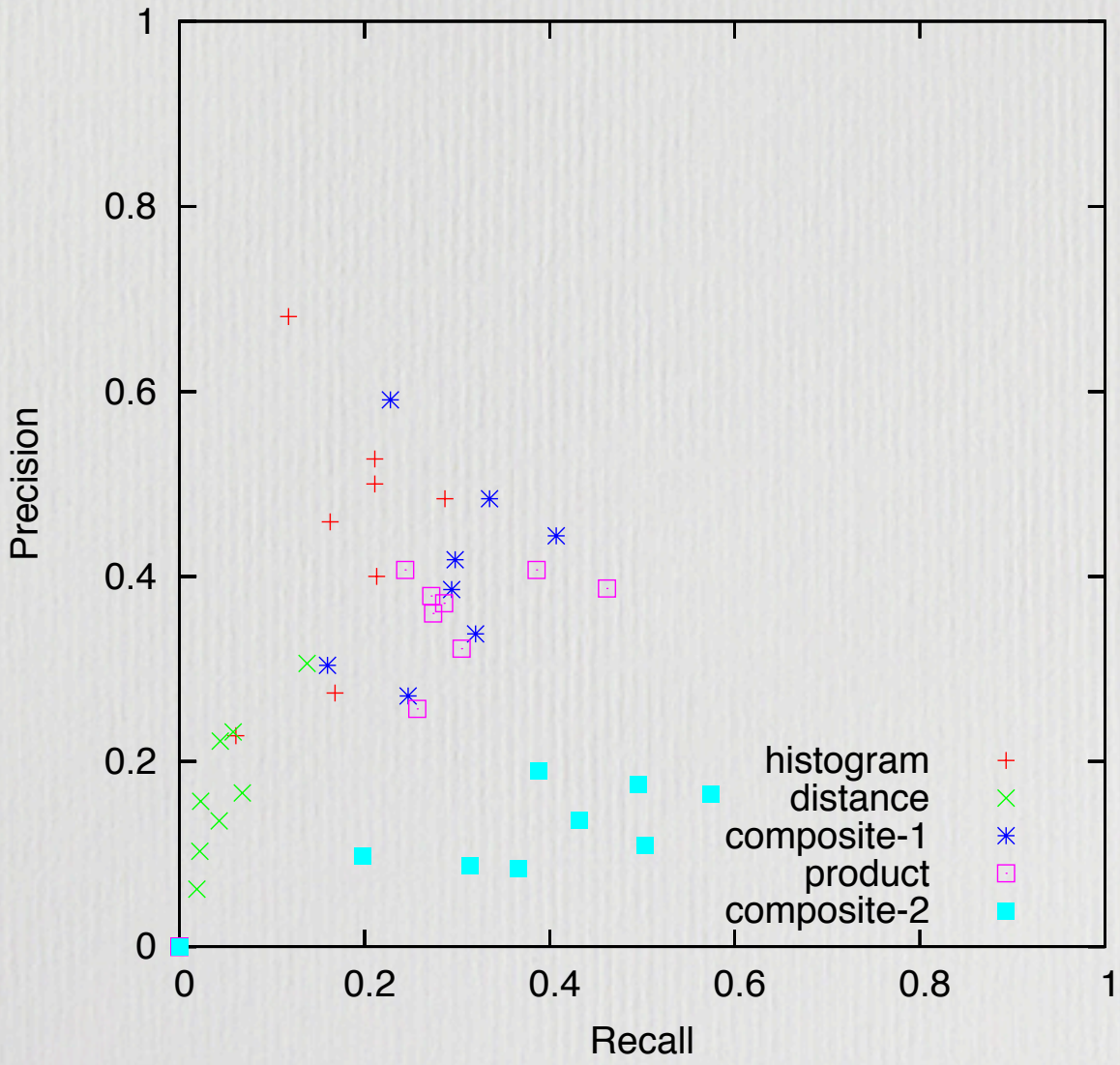
Shot Boundaries, Overall Results



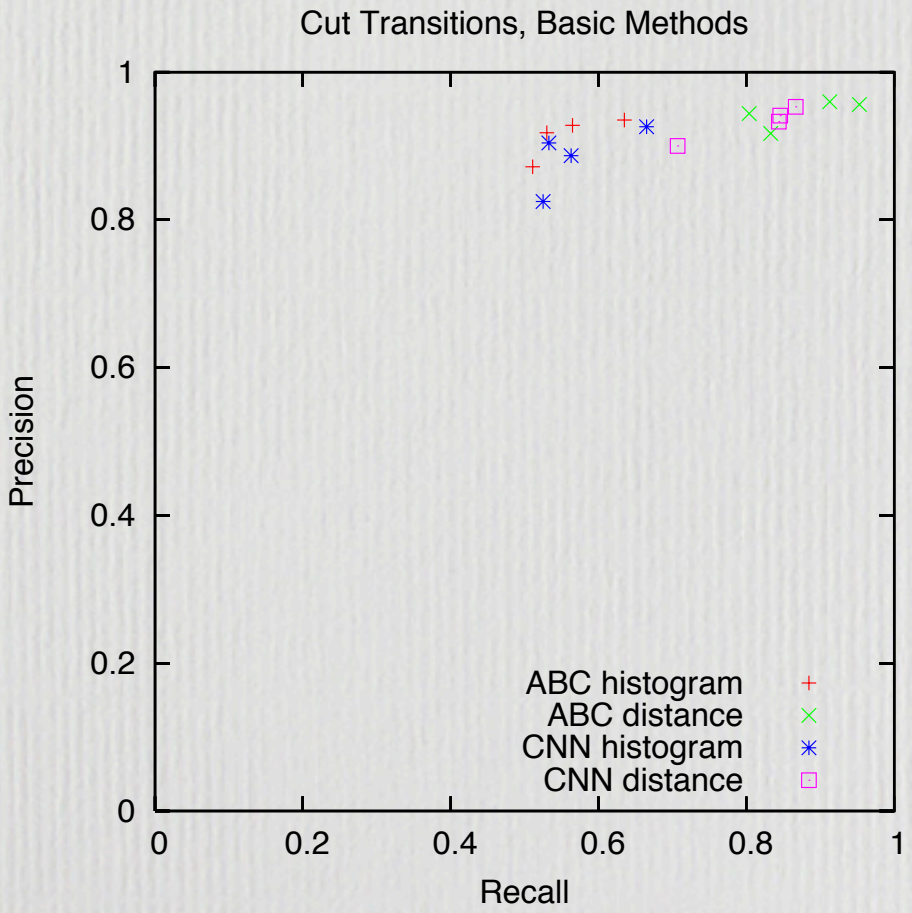
Shot Boundaries, Cut Transitions

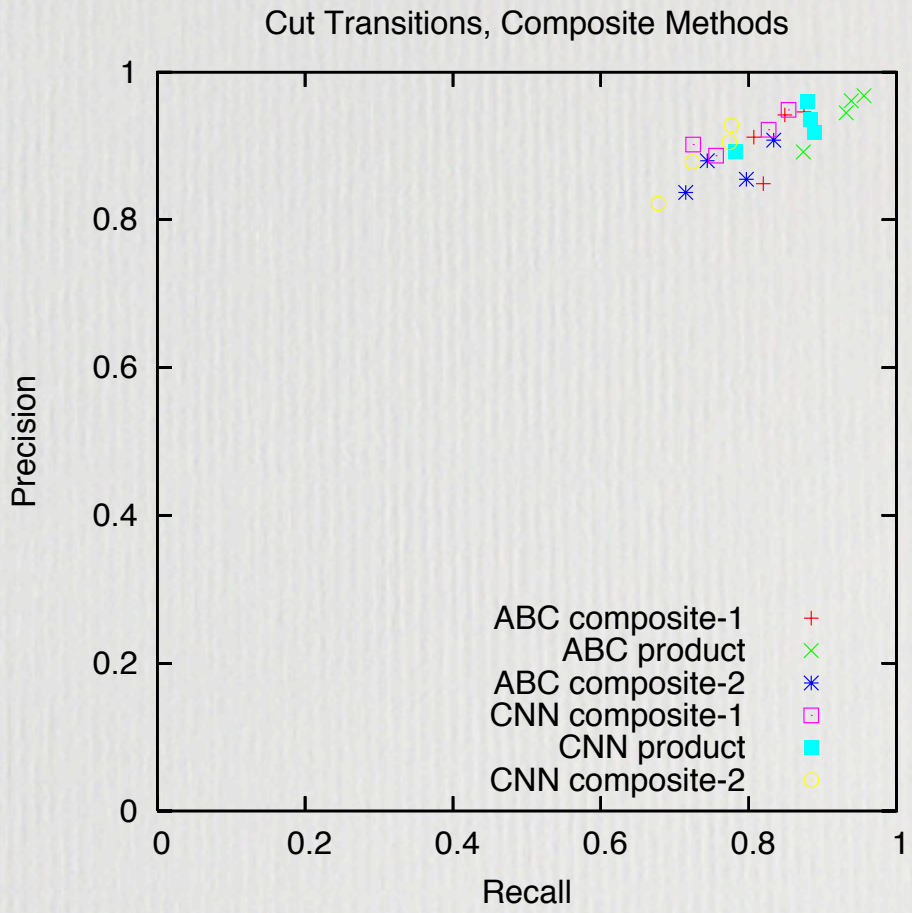


Shot Boundaries, Gradual Transitions

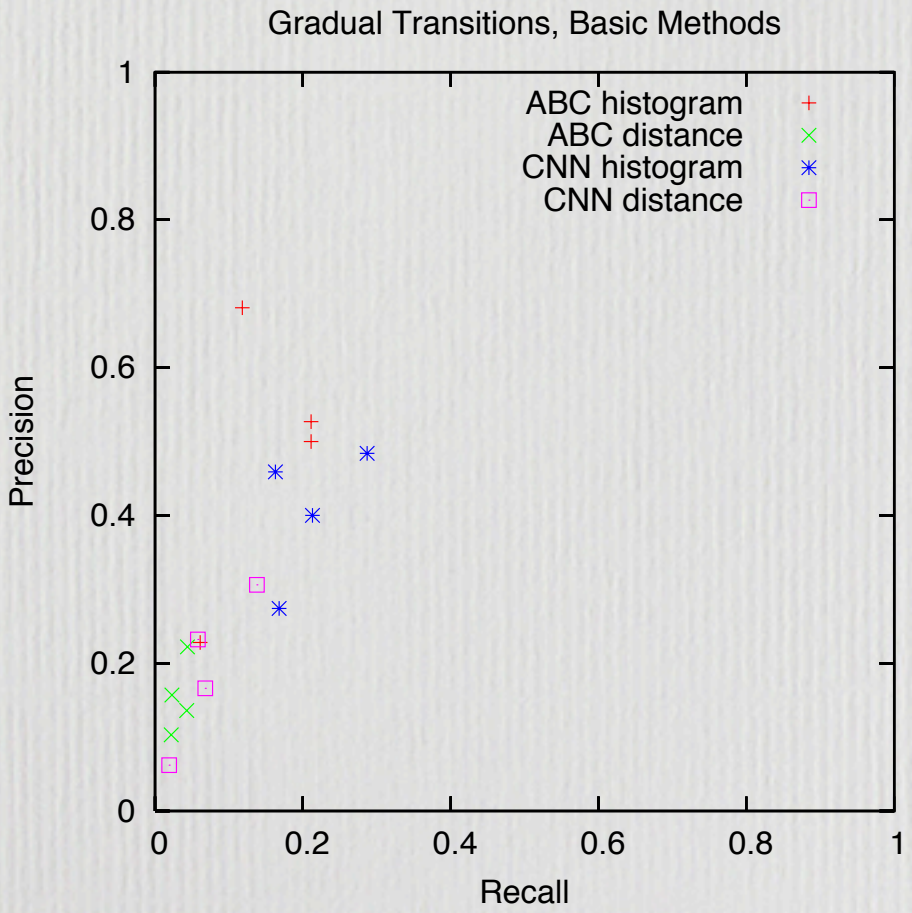


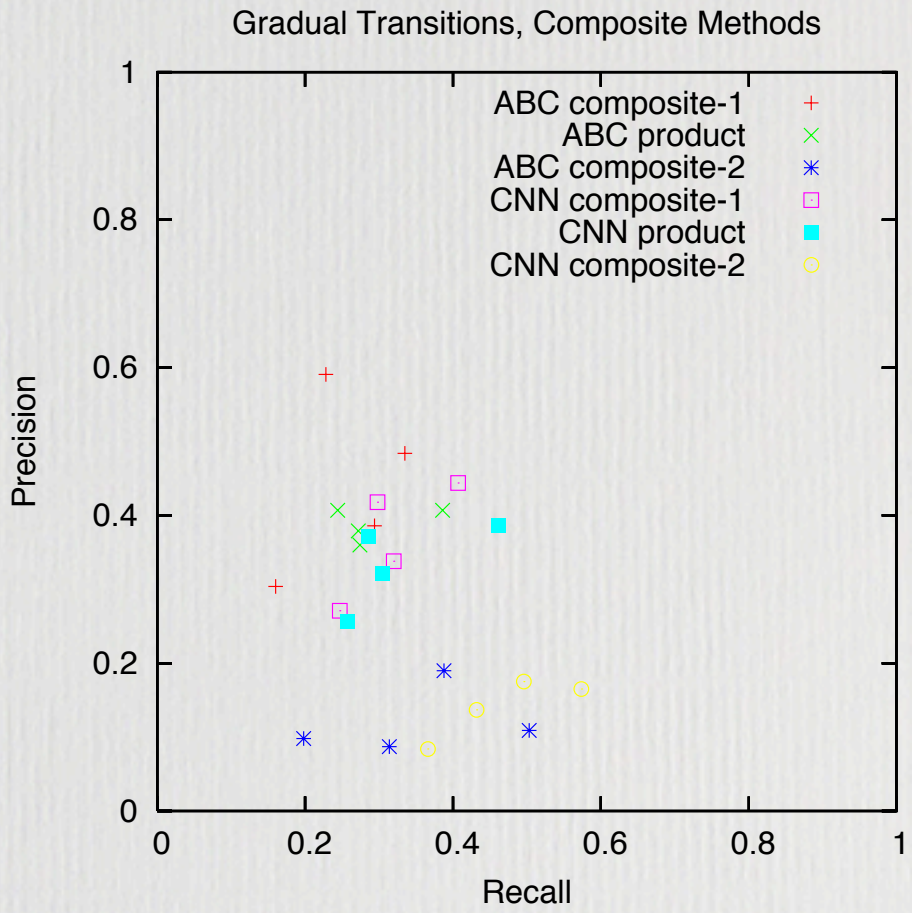
Shot Boundaries, By Transition Type & Source





Shot Boundaries, By Transition Type & Source





Conclusions

- Basic metrics can perform surprisingly well on cuts
- Composite metrics can damp out peculiarities of component metrics, just as in ASR
- Product metrics appear to be the way to go
  - No arcania of boolean exploration

Future Work

- The obvious...
  - Frame sequence metrics
  - Follow the approach presented here
- Specialized event detectors
  - camera flash
  - video effects (e.g., wipes, dissolves, ...)