Depth Layers from Occlusions

The goal

Segmented foreground blobs

Depth-ordered layers

Previous work

- Brostow, Essa, ICCV 1999
  - Presegment scene
  - Edges form regions of common depth
  - Touch = is behind of

- Stauffer et al. 1997
  - Assume blob is a person, identify head
  - With calibrated ground plane object position known

Problem underconstrained

Scanline over time

depth constraint

- Only relative depth recoverable
- Any depth assignment corresponds to possible scene

Nomenclature

- Scene boundary pixels hit more often than object boundary pixels
- Use MDL to find simple explanation of observation
  - Devise encoding that exploits scene boundaries
  - Find assignment of frames to layers with short encoding

Depth assignment using MDL

- Scene boundary pixels hit more often than object boundary pixels
- Use MDL to find simple explanation of observation
  - Devise encoding that exploits scene boundaries
  - Find assignment of frames to layers with short encoding

Optimizing layer assignments

- Wanted
  - number of layers
  - assignments of blobs to layers
- Divide sequence in half
- Adjust depth of halves
- Divide sequence into quarters
- Adjust depth of quarters
- Final pairwise collapse

Lab sequence

Consortion sequence

Lab sequence - 2 layers

- Supress still images
  - consecutive images must have minimum difference, otherwise delete

- Accretion/deletion
  - Image edges
  - Semi-rigid shape constraint