



Stereovision for peoplecounting & pedestrian activity monitoring

30/05/08



Our current investigation

Can we use stereovision to design a very accurate people counting system ?

Potential benefits

- Can provide information enabling 3D localization and size determination of objects.
- Is less sensitive to changing illumination conditions and related fake detections (shadow,..).

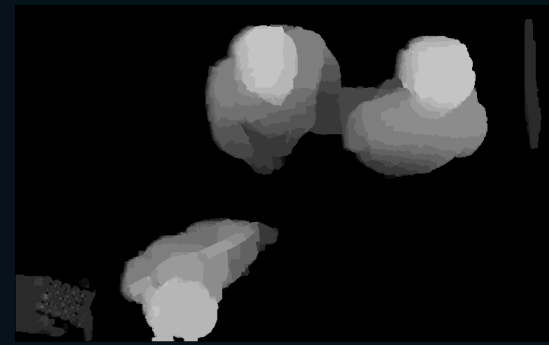
Potential drawbacks and limitations:

- Sensor cost, sensor settings (calibration).
- Computational cost.
- Deal with incomplete view (occlusions).

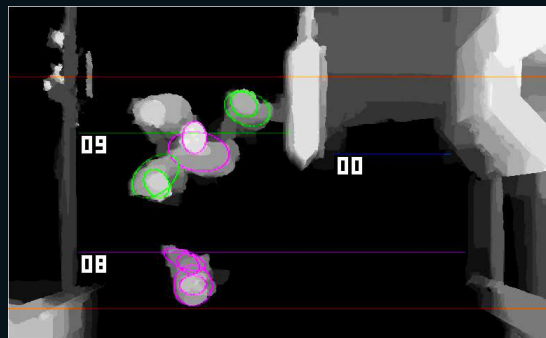


Chosen approach

- Step 1: dense disparity/depth map computation.



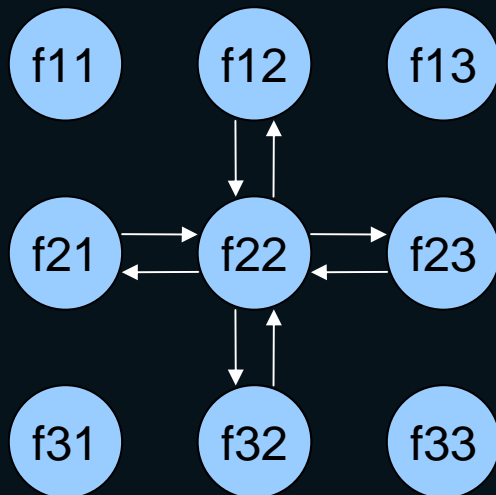
- Step 2: model registration.





Step 1: Disparity computation

- First undistort & rectify left and right images in order to perform search for image pixel correspondences on associated (epipolar) lines only.
- Secondly search for correspondences. Chosen algorithm is based on « belief propagation » technique: Iterative method relying on pixel-to-pixel difference and assumption of disparity « smoothness ». Resulting disparity map are dense.

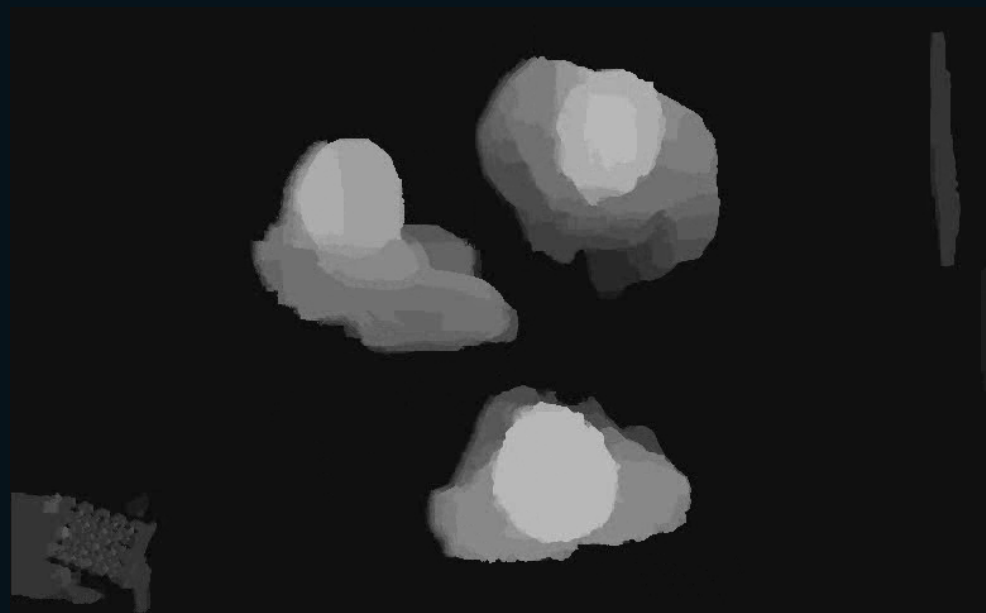


$$E = \sum_{p, q \in N} V[f_p, f_q] \prod_p D[f_p]$$



- Current code processes 5 frames/s (750x480) or 22 frames/s (320x240) on a 3Ghz PC workstation.

Process is iterative and highly parallelizable (some functions already using SSE2 SIMD instructions).



Step 2: Model Registration



- Not optimal yet. Current algorithm considers ideal top views from a distant camera (on ceiling). Human bodies are modeled by head & shoulder only.
- Improvement are required to handle a non ideal observation point (where bodies are observed at varying angle).

