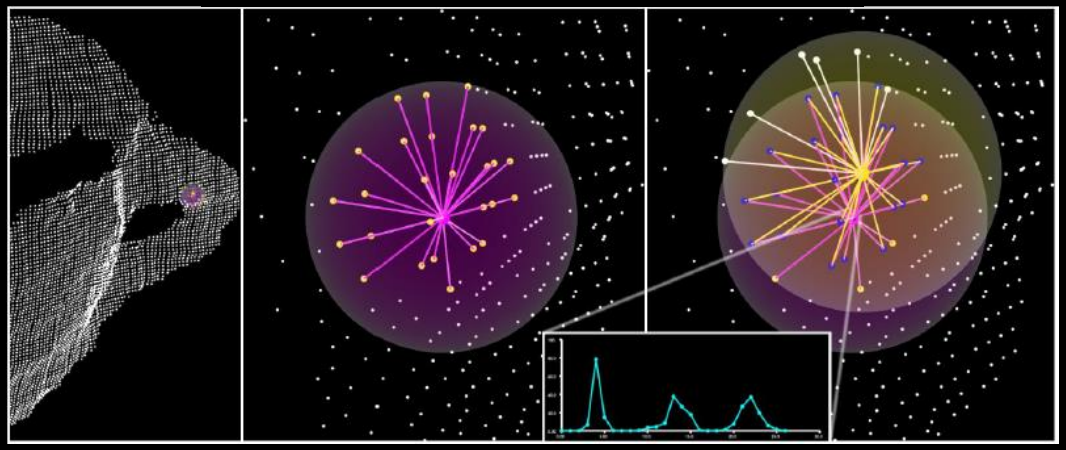
pointcloudlibrary



PCL Laboratory 4
Examples and exercises

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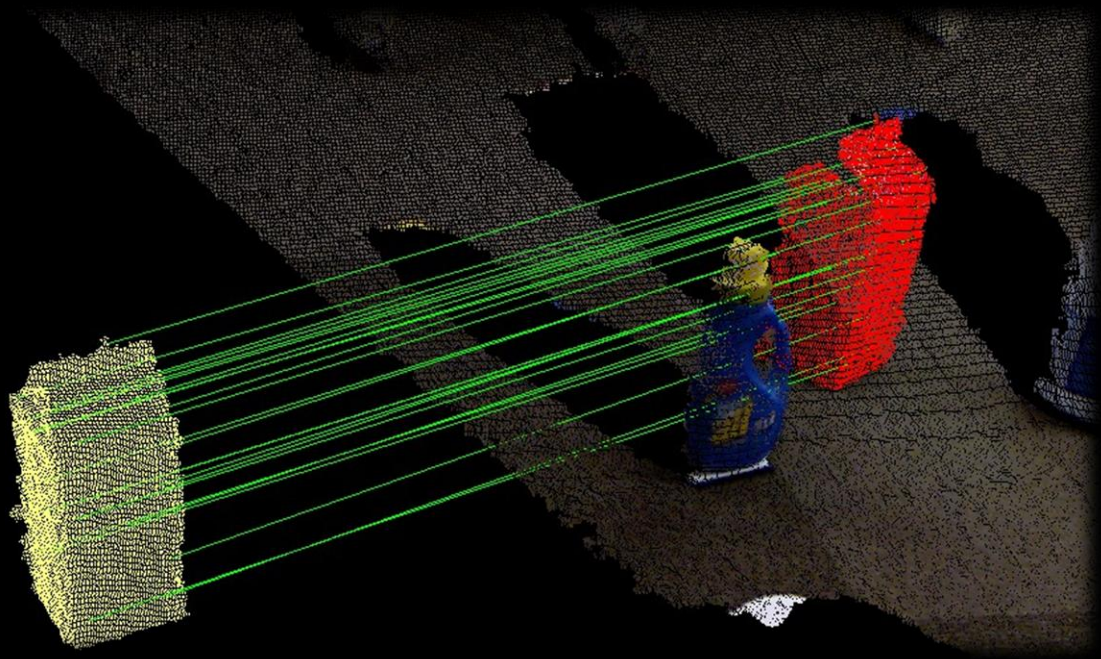
Example: demo_object_recognition

- Object (milk carton) detection in a scene:
  - uniform sampling for keypoint detection
  - SHOT as features descriptor
  - Geometric Consistency (or Hough 3D) for grouping correspondences
  - `./demo_object_recognition ../dataset/milk.pcd ../dataset/milk_cartoon_all_small_clorox.pcd -k -c`



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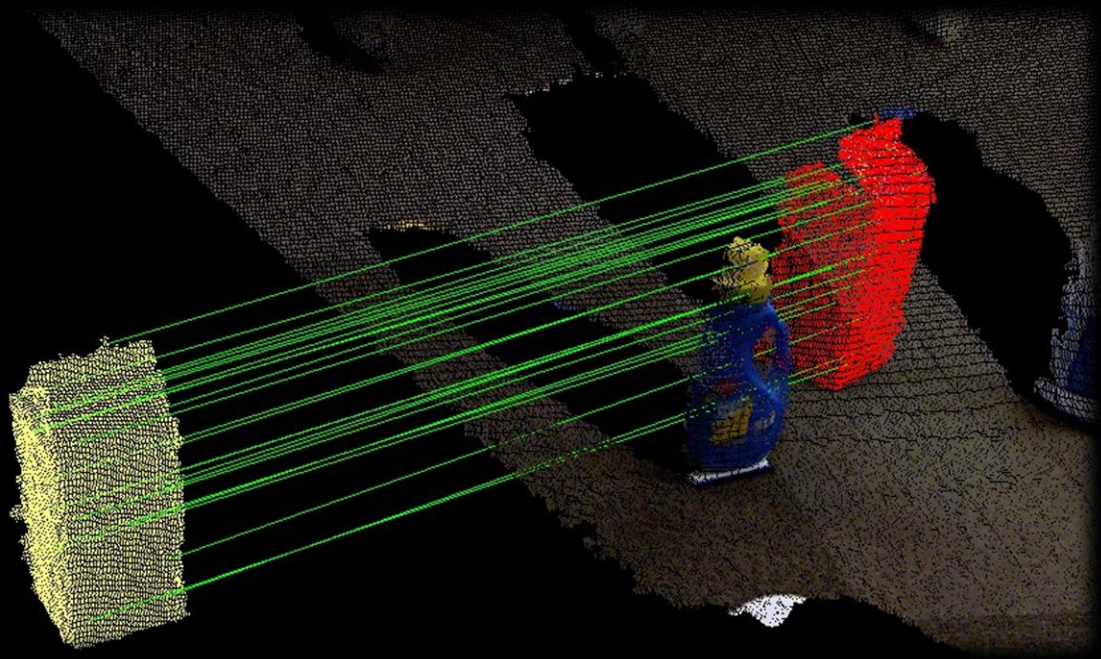
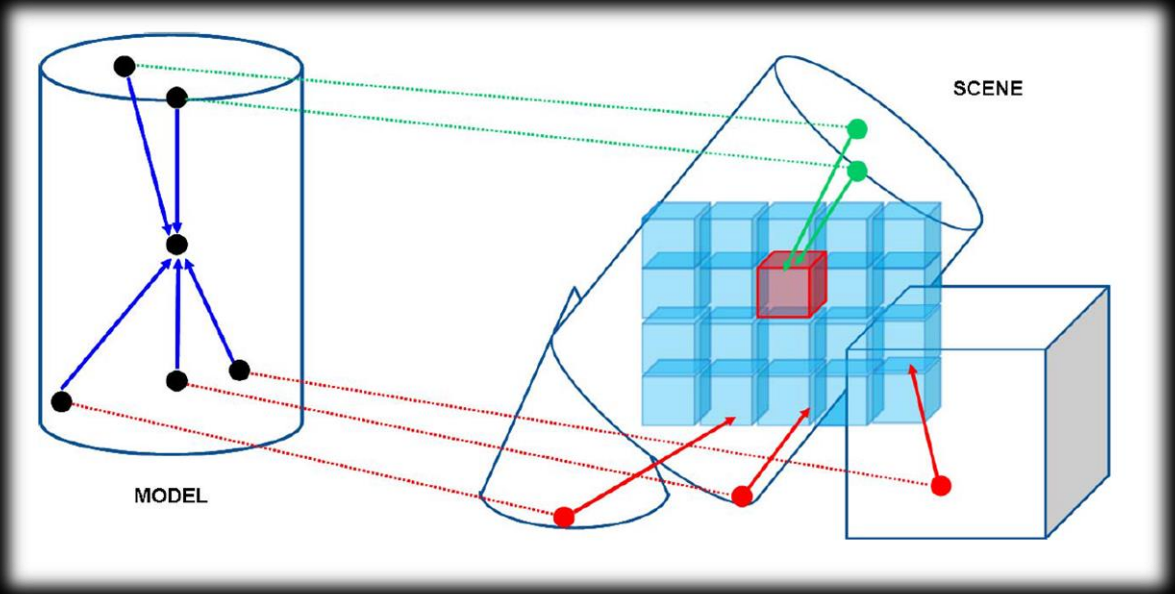
Geometric Consistency

- Simple clustering algorithm enforcing simple geometric constraints between pairs of correspondences.
- It starts from a seed correspondence, then it iteratively aggregates those correspondences that satisfy the constraints.
- Reference: *H. Chen and B. Bhanu:* "3D free-form object recognition in range images using local surface patches", Pattern Recognition Letters, vol. 28, no. 10, pp. 1252-1262, 2007.



Hough 3D

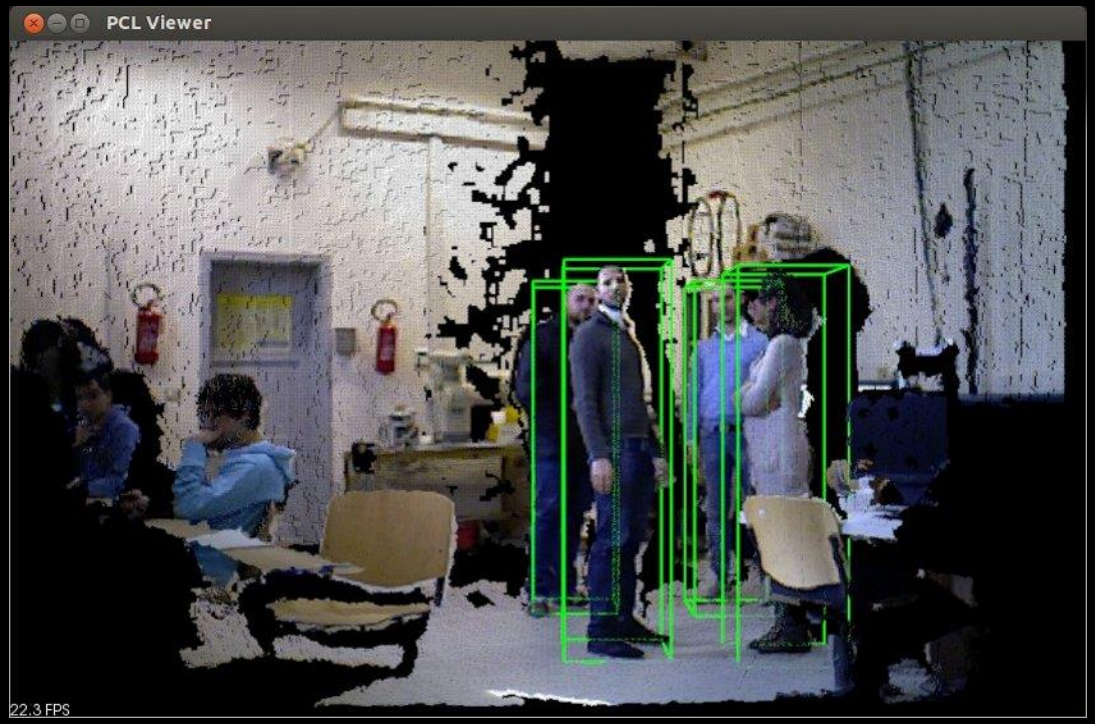
- Clustering algorithm based on a 3D Hough voting scheme;
- Every correspondence votes for a possible object center.
- Reference: *F. Tombari and L. Di Stefano:* "Object recognition in 3D scenes with occlusions and clutter by Hough voting", 4th Pacific-Rim Symposium on Image and Video Technology, 2010.
- It performs better than Geometric Consistency



Example: peopleDetector

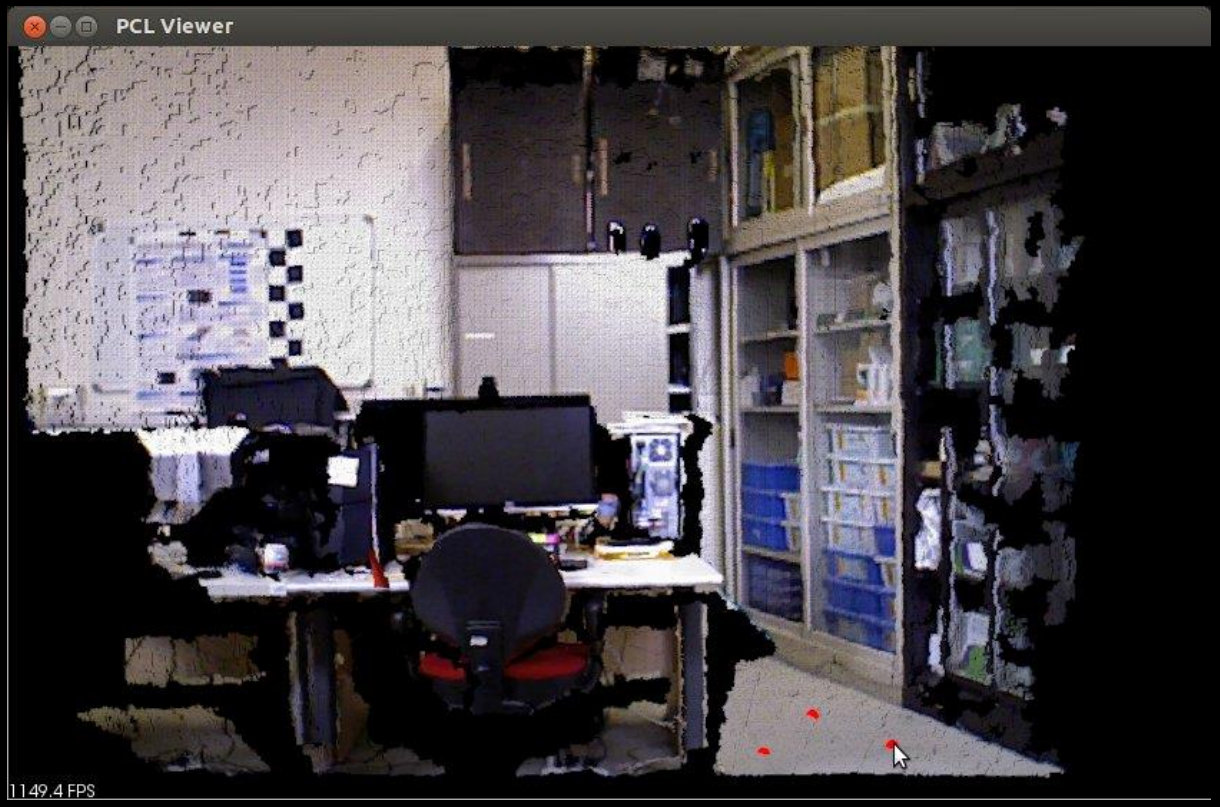
- Performs people detection on XYZRGB point cloud
- Based on:

M. Munaro, F. Basso and E. Menegatti. Tracking people within groups with RGB-D data. In Proceedings of the International Conference on Intelligent Robots and Systems (IROS) 2012, Vilamoura (Portugal), 2012.



Example: peopleDetector

- Ground plane is manually selected by *Shift+Clicking* on 3 (non collinear) ground points:



Example: peopleDetector

- Some parameters can be chosen from command line:

--help <show_this_help>
--svm <path_to_svm_file>
--conf <minimum_HOG_confidence (default = -1.5)>
--min_h <minimum_person_height (default = 1.3)>
--max_h <maximum_person_height (default = 2.3)>

- Try to change the 'conf' parameter and see how the number of detected people changes.

Exercise

- Implement automatic ground plane estimation to be used for people detection.
- Color the detected ground plane points in red.
- It should work on point clouds from different point of views, but with plane yOz perpendicular to the ground plane (camera roll = 0°).
- Test it with the images provided in ‘data/people’ folder.
- You can visualize the test clouds with ‘show_clouds_people’.

Exercise

- Register together at least five out of the six pointclouds provided in ‘data/nao’ folder of PCL Lab 4.
- Keep only the part of the clouds corresponding to the robot.
- You can visualize the test clouds with ‘show_clouds_nao’.