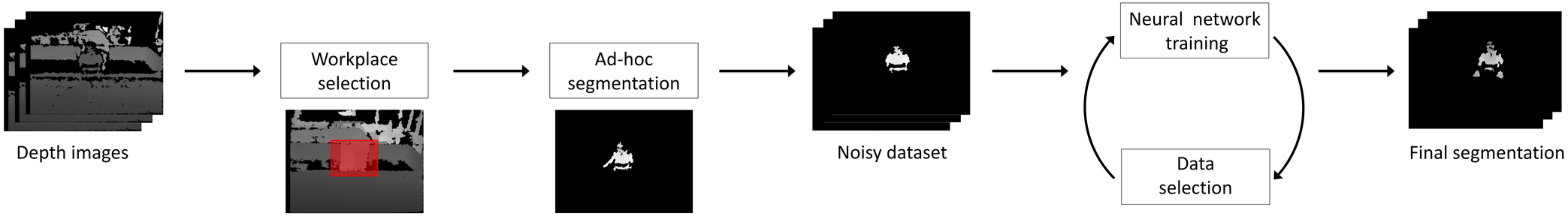
ITERATIVE DATASET FILTERING FOR WEAKLY SUPERVISED SEGMENTATION OF DEPTH IMAGES

Thibault Blanc-Beyne[1,2], Axel Carlier[2], Vincent Charvillat[2]
[1]Ebhys, France [2]IRIT - Université de Toulouse, France

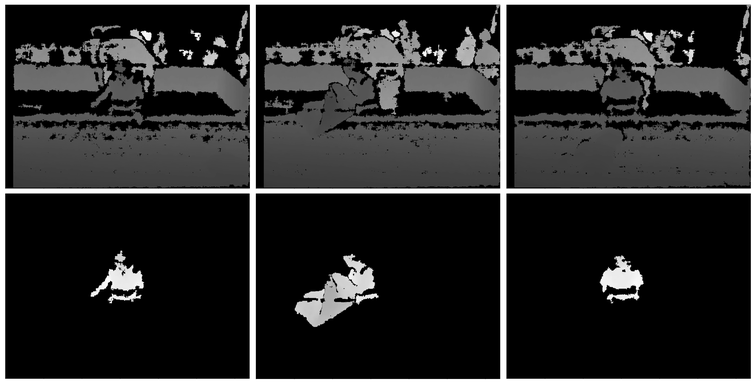


CONTEXT

- Challenging environment:
  - Industrial workplace (reflective clothes)
  - Uncontrollable lighting conditions
  - Moving objects
  - Constrained position of the sensor
- Challenging data:
  - Noisy depth images
  - No RGB
  - High variability
  - No labelled data

WEAKLY SUPERVISED AUTOMATED SEGMENTATION

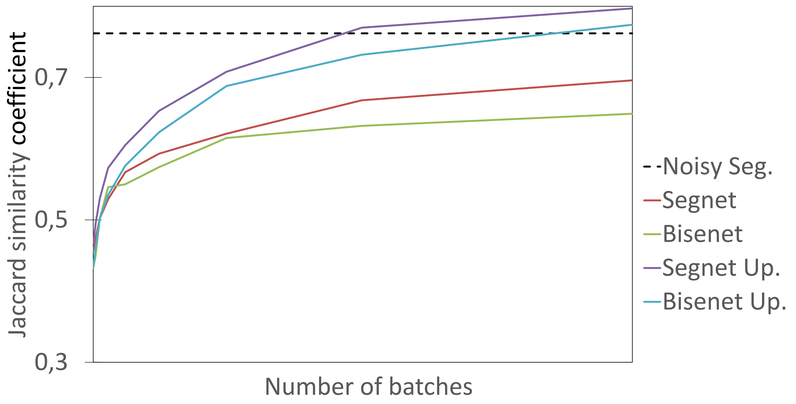
- Ad-hoc process:
  - Background subtraction
  - Workplace selection
- Two steps:
  - Static background removal
  - Operator selection/tracking



Results of our automated segmentation

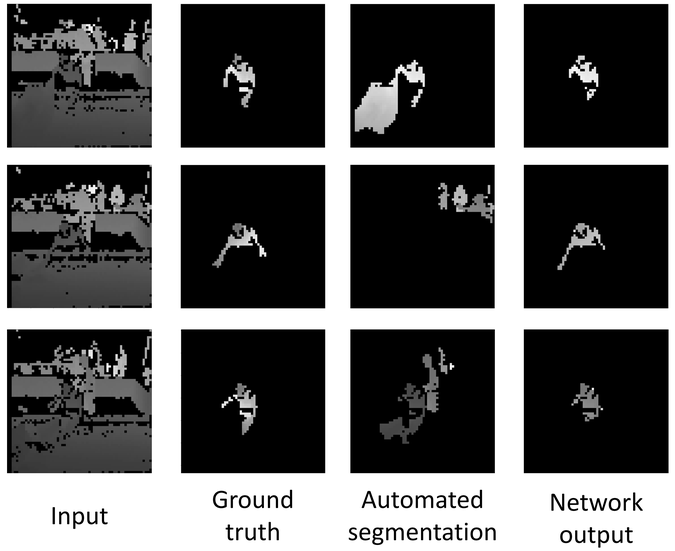
NEURAL NETWORK TRAINING

- Training two networks adapted from Segnet [1] and BiSeNet [2]
- Noisy automated segmentation used as training data:
  - High variability in the quality
  - No “real” ground truth
- Method to actively select data of acceptable quality:
  - Comparison between the ad-hoc and the network segmentations
  - Remove worst data using the Jaccard similarity coefficient
  - Multiple updates during the learning phase of the network
- Train the network on the selected data
- Test on hand-labelled data to measure performances



Evolution of the Jaccard coefficient during the training of the network

RESULTS



Results obtained by our network

REFERENCES

[1] V. Badrinarayanan, A. Kendall, and R. Cipolla, “Segnet: A deep convolutional encoder-decoder architecture for image segmentation,” 2017 IEEE Transactions on Pattern Analysis & Machine Intelligence, vol. 39, pp. 2481–2495, 2017.
[2] C. Yu, J. Wang, C. Peng, C. Gao, G. Yu, and N. Sang, “Bisenet: Bilateral segmentation network for real-time semantic segmentation,” in European Conference on Computer Vision. Springer, 2018, pp. 334–349.