

CORSMAL demo: Localisation and shape estimation of containers

<http://corsmal.eecs.qmul.ac.uk>

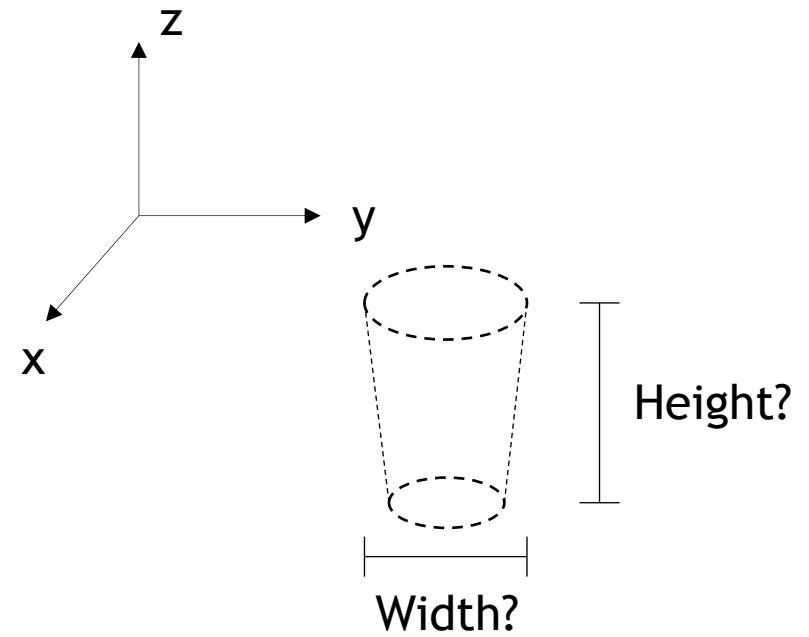
The problem



View 1



View 2

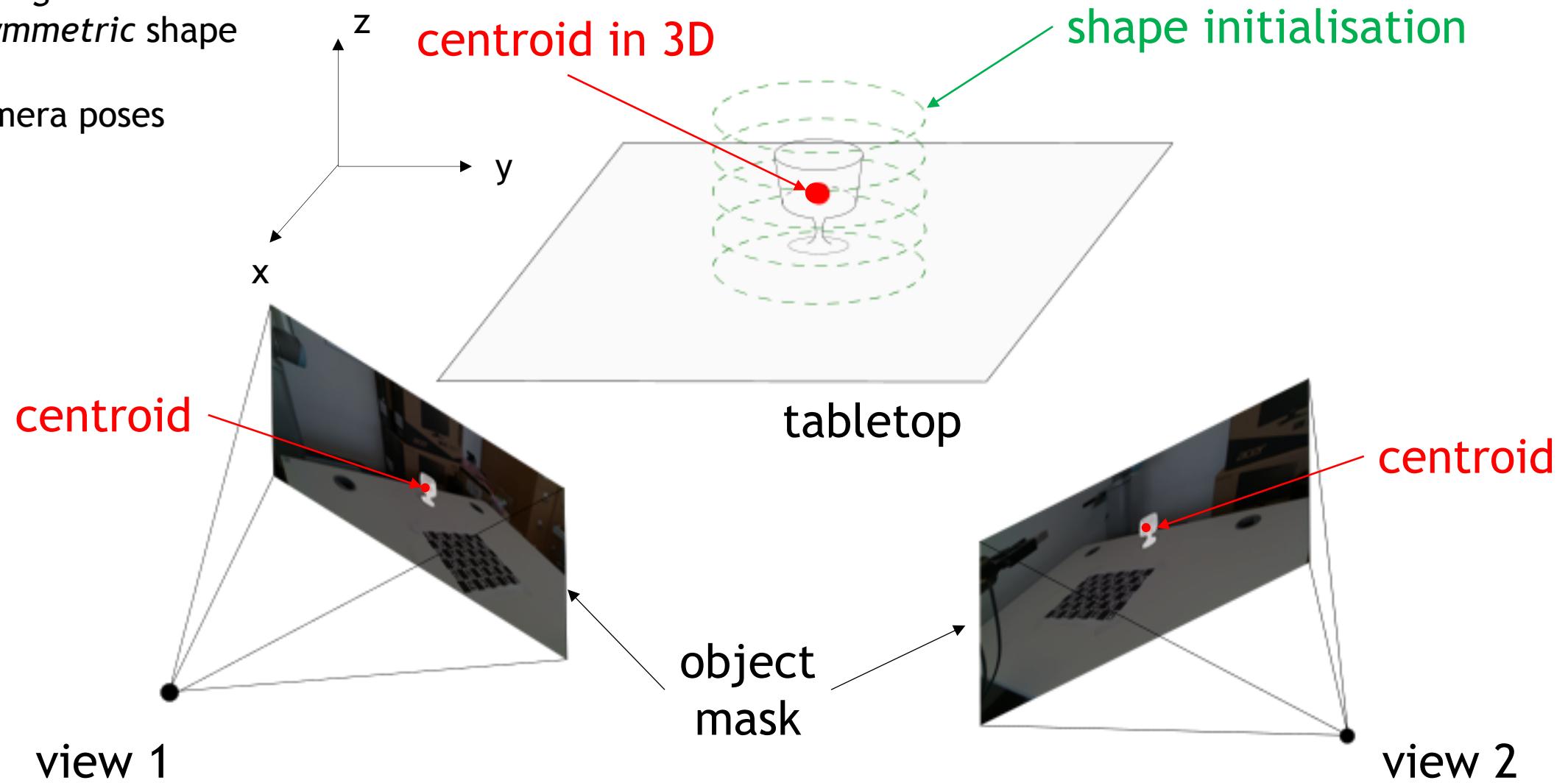


How to estimate the dimensions in 3D of unknown objects?

LoDE: Localisation and object Dimension Estimator

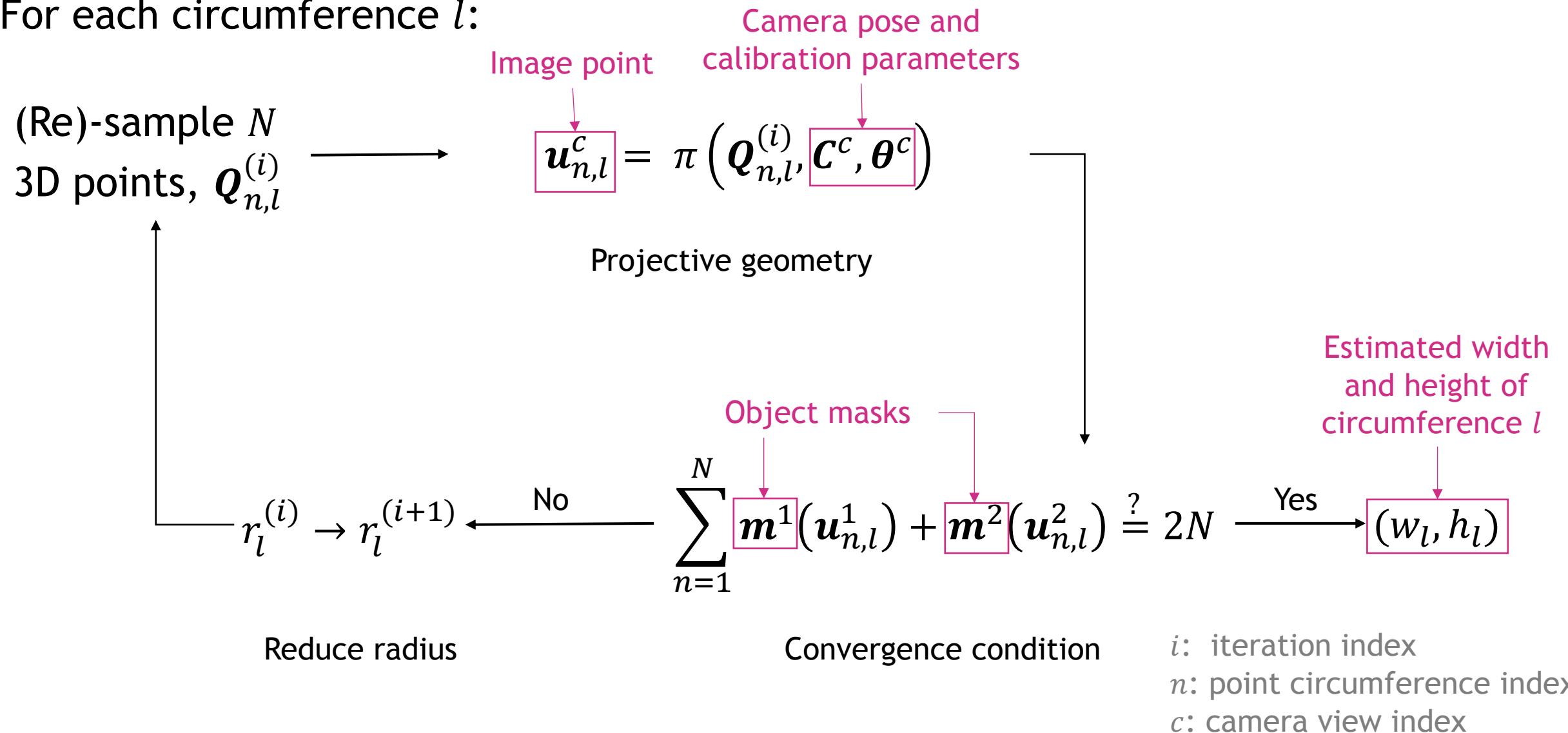
Objects *upright* and with
circular symmetric shape

Known camera poses

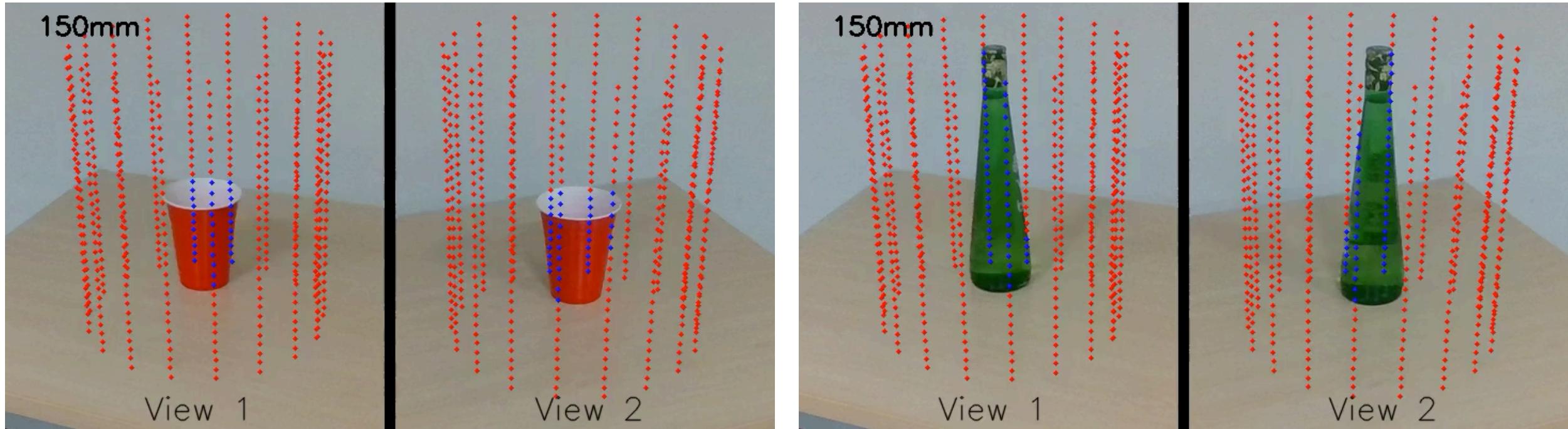


Iterative multi-view 3D-2D shape fitting

For each circumference l :



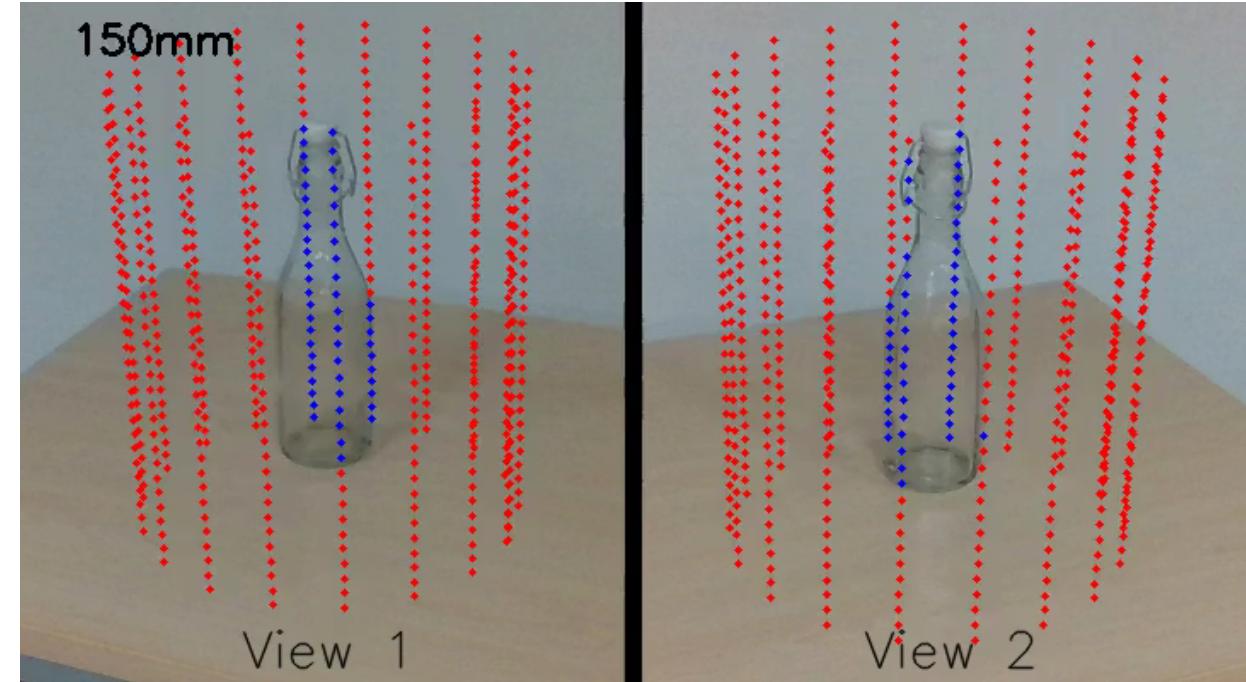
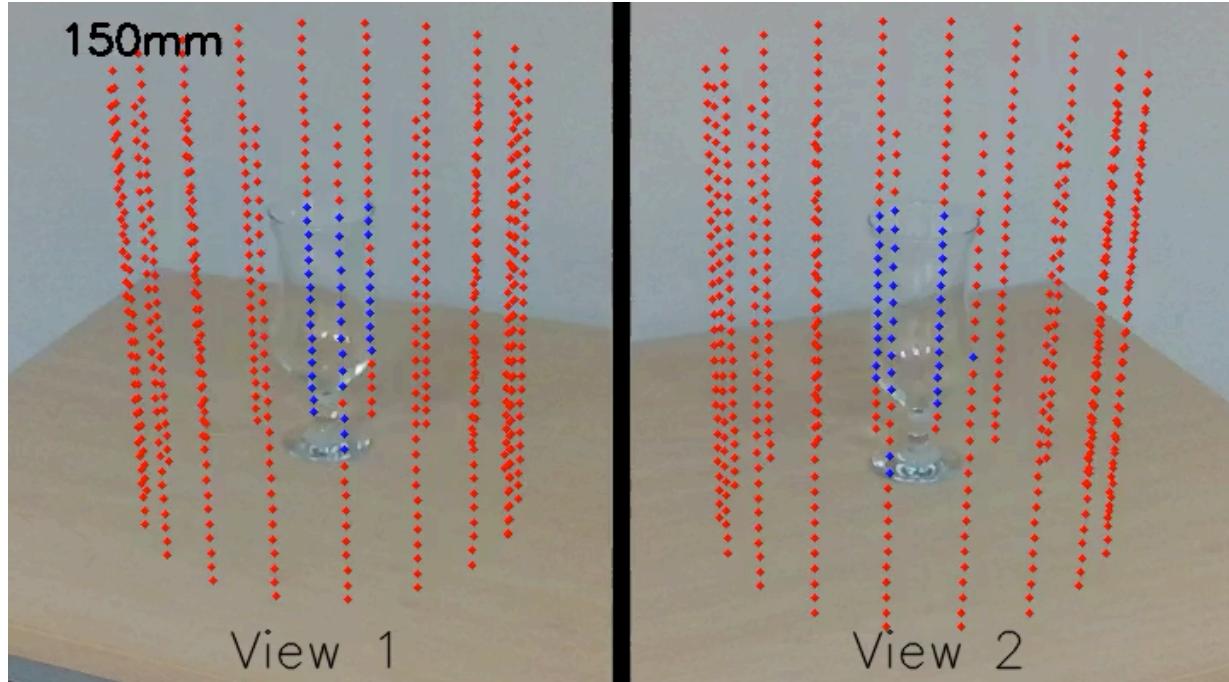
Iterative multi-view 3D-2D shape fitting



- 500 circumferences (1mm separation)
- 20 points per circumference
- Radius schedule: $\{150.0, 149.5, \dots, 1.5, 1.0\}$ mm

- projected points lying outside the segmentation masks
- not converged points lying inside the segmentation masks
- converged points lying inside the segmentation masks

Iterative multi-view 3D-2D shape fitting



- 500 circumferences (1mm separation)
- 20 points per circumference
- Radius schedule: {150.0, 149.5, ..., 1.5, 1.0} mm

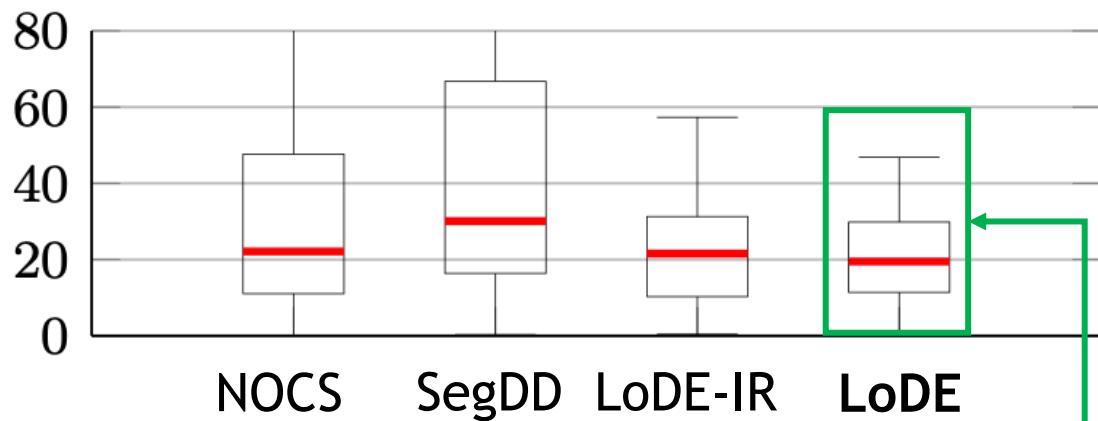
- projected points lying outside the segmentation masks
- not converged points lying inside the segmentation masks
- converged points lying inside the segmentation masks

Experimental setup

Method	# of views	RGB	Depth	Infrared (IR)
 NOCS [Wang2019CVPR]	Single	✓	✓	
 SegDD: Segmentation on RGB-D images + back-projection	Single	✓	✓	
 LoDE-IR	Two (narrow baseline)			✓
 LoDE	Two (wide baseline)	✓		

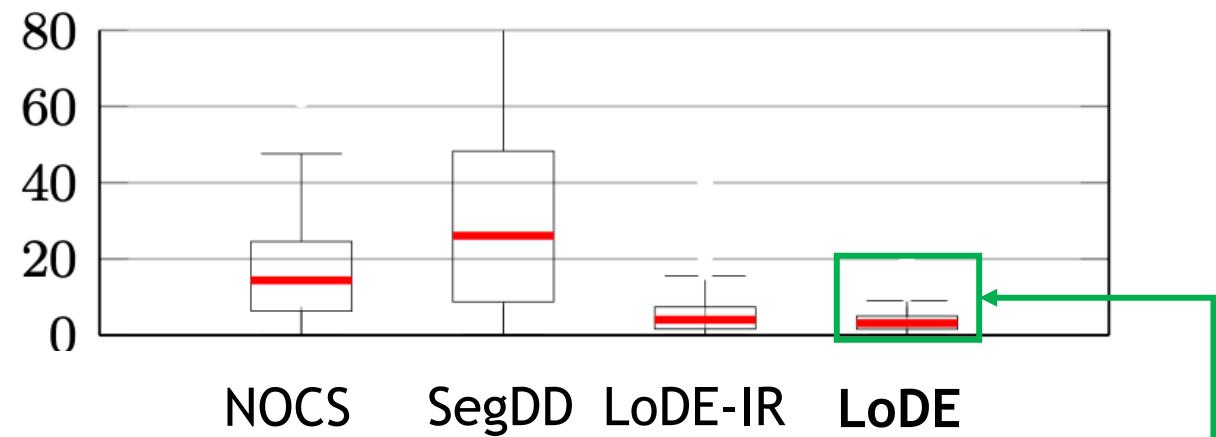
Object dimensions results

Absolute error for object height [mm]



Smaller standard deviation

Absolute error for object *width* [mm]



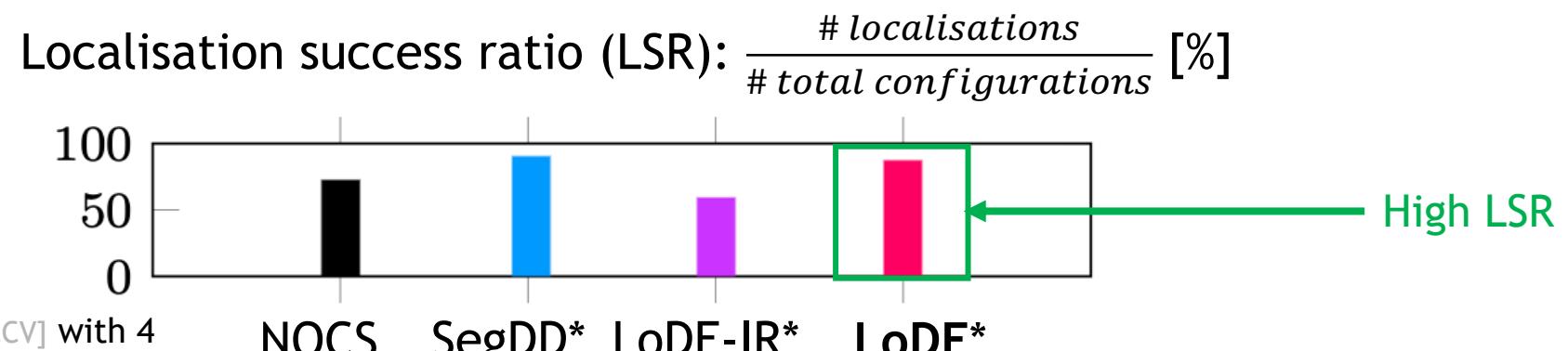
More accurate width estimation

CORSMAL Container dataset (207 configurations)
Results provided for localised object

Object localisation results via instance segmentation

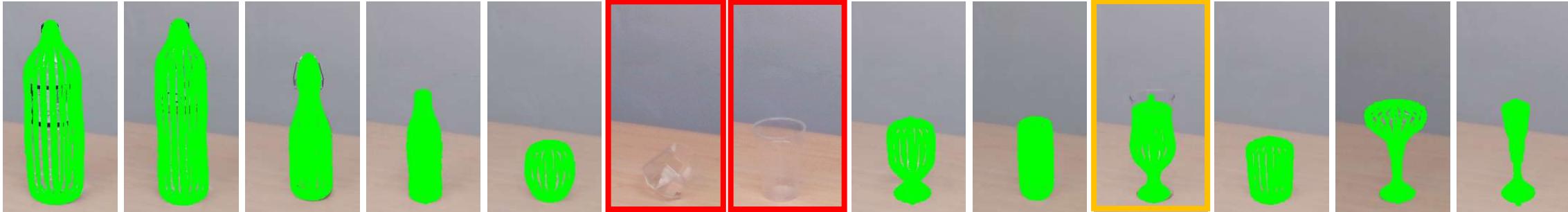
Some transparent objects not found in either of the two views

Inaccurate masks (truncated or not fitting the real object boundaries)

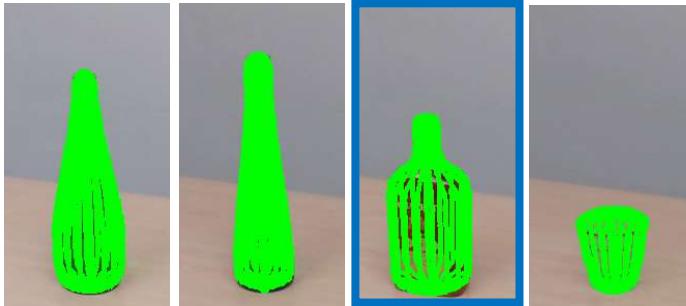


Shape fitting at convergence

Transparent



Translucent

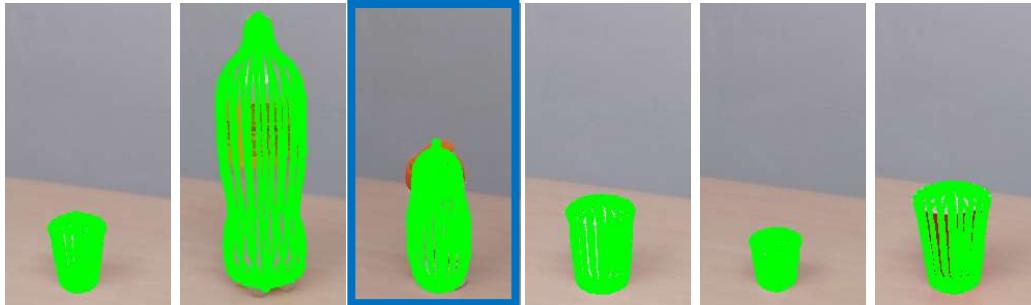


Segmentation failure

Inaccurate segmentation

Inaccurate estimation

Opaque



Qualitative comparison

NOCS



SegDD



LoDE-IR



LoDE



Conclusions

LoDE: localisation and object dimensions estimation (in 3D)

- Iterative multi-view 3D-2D shape fitting algorithm
- Upright objects with circular symmetric shape
- No depth, no prior 3D object models, no markers



Future work:

- Occlusions
- General object shapes
- Different object poses

<https://corsmal.eecs.qmul.ac.uk/LoDE.html>

Xompero, A., Sanchez-Matilla, R., Modas, A., Frossard, P., Cavallaro, A.

Multi-view shape estimation of transparent containers

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