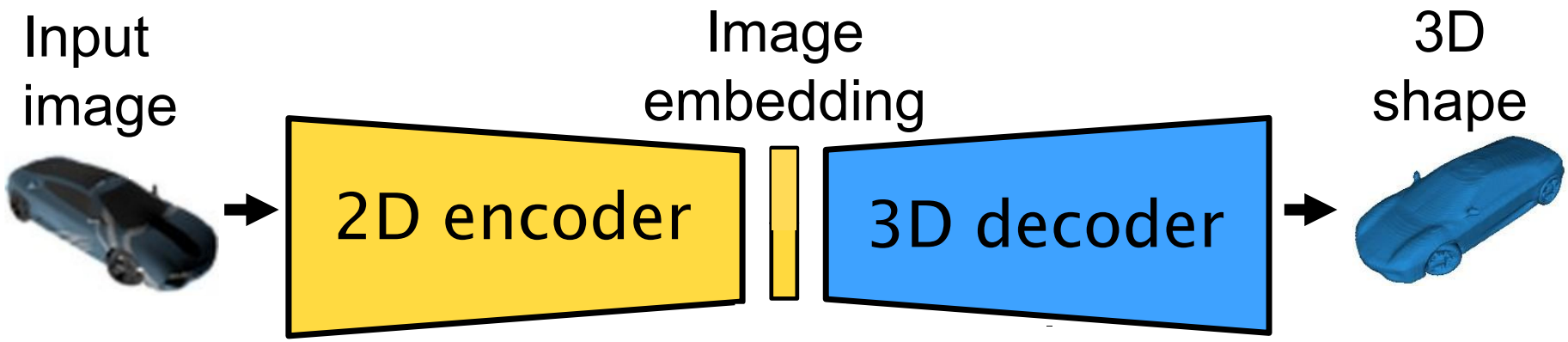
Few-Shot Single-View 3D Object Reconstruction with Compositional Priors

Mateusz Michalkiewicz, Sarah Parisot, Stavros Tsogkas, Mahsa Baktashmotlagh, Anders Eriksson, Eugene Belilovsky

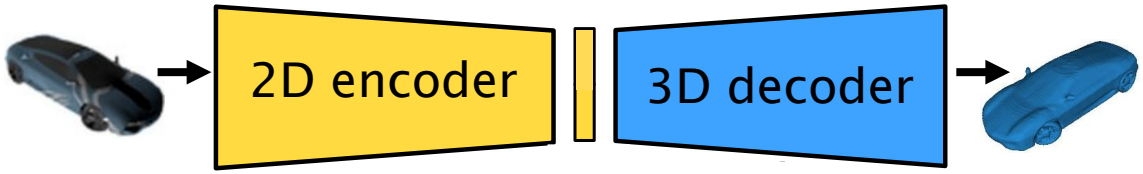





Single view 3D reconstruction



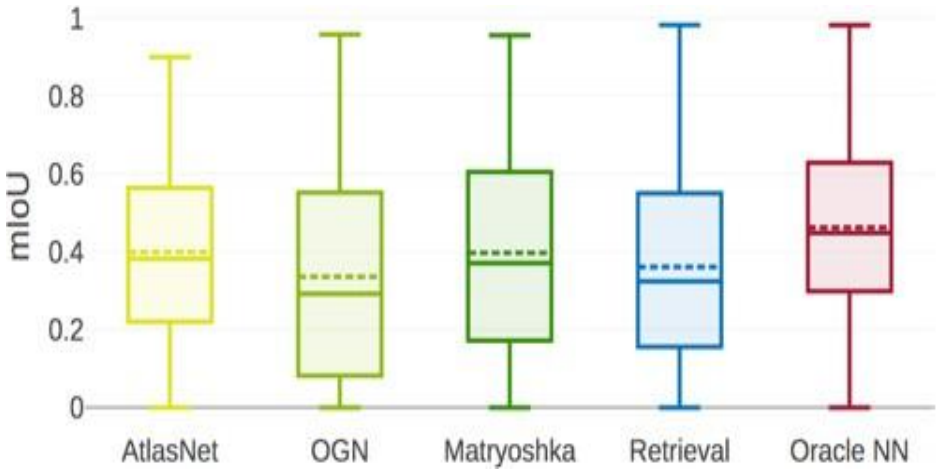
Pitfalls of fully-supervised models



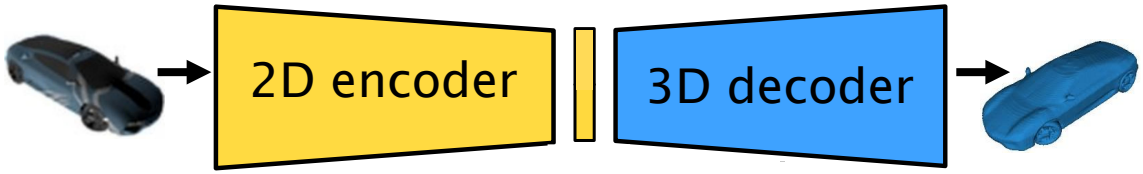
What Do Single-view 3D Reconstruction Networks Learn?

Maxim Tatarchenko*[1], Stephan R. Richter*[2], René Ranftl[2], Zhuwen Li[2], Vladlen Koltun[2], and Thomas Brox[1]

[1]University of Freiburg [2]Intel Labs



Pitfalls of fully-supervised models



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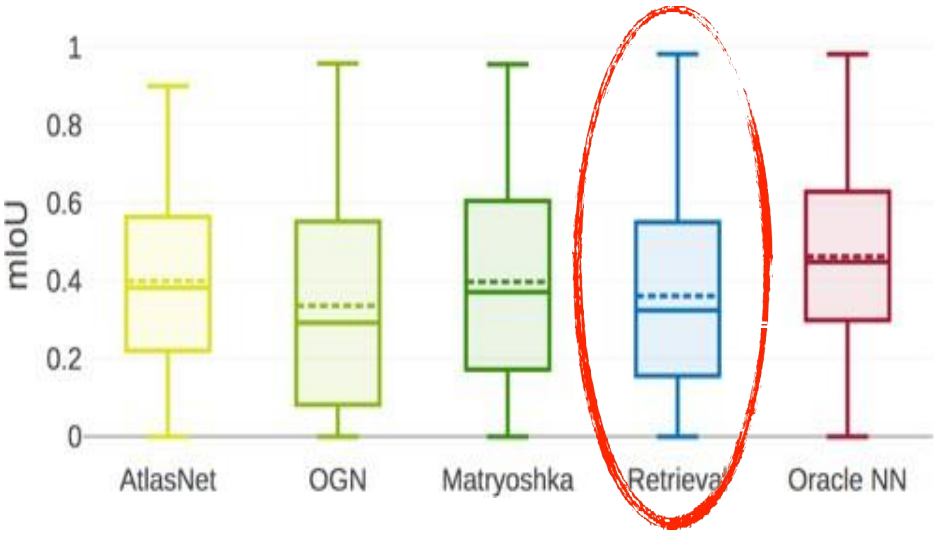
Nearest Neighbour retrieval matches performance of complicated models!

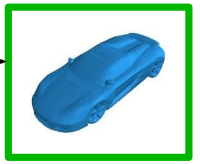


Few-shot generalization to novel classes

Base classes (many examples)

Nearest Neighbor

good performance



2D encoder

3D decoder

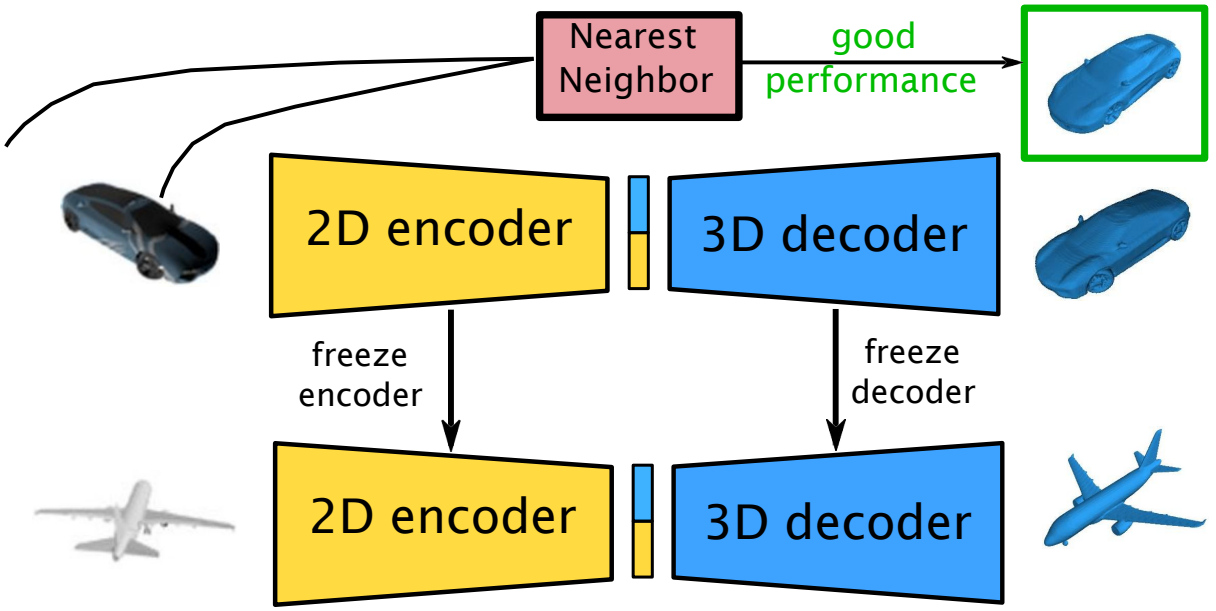
freeze encoder

freeze decoder

Few-shot generalization to novel classes

Base classes (many examples)

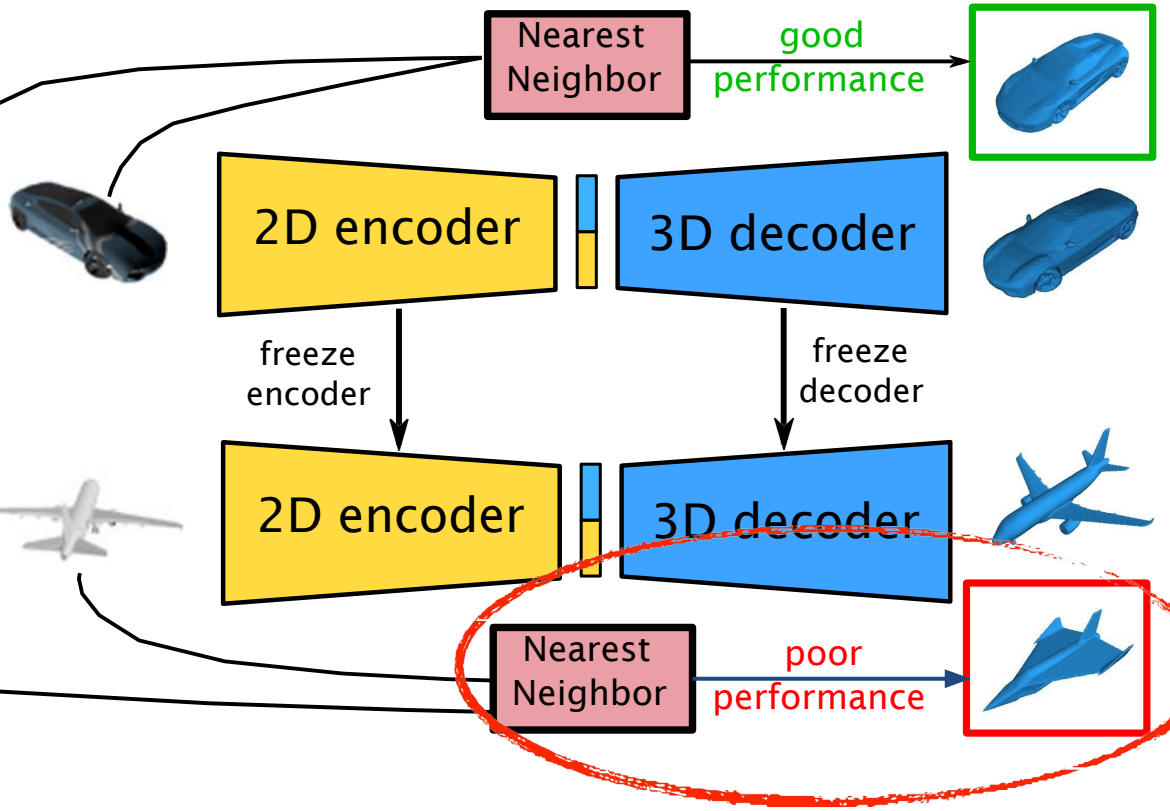
Novel classes (few examples)



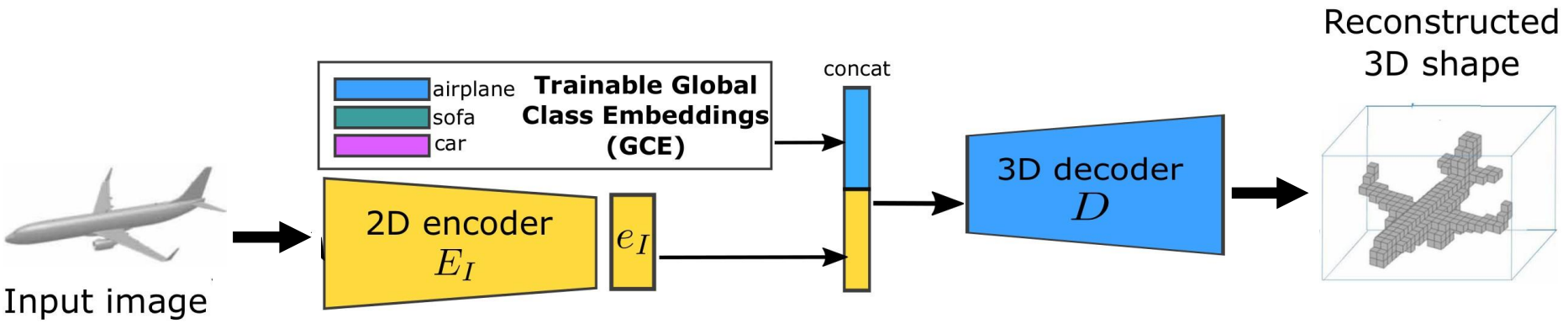
Few-shot generalization to novel classes

Base classes (many examples)

Novel classes (few examples)

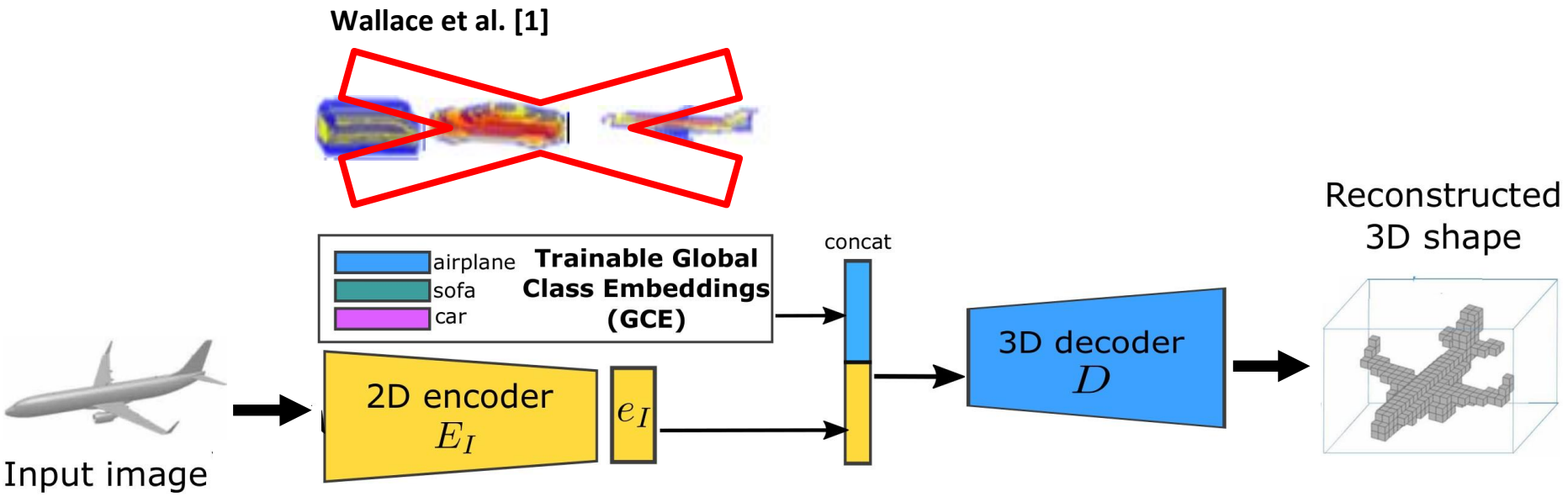


Learning global class shape priors



[1] Few-Shot Generalization for Single-Image 3D Reconstruction via Priors, ICCV 2019

Learning global class shape priors



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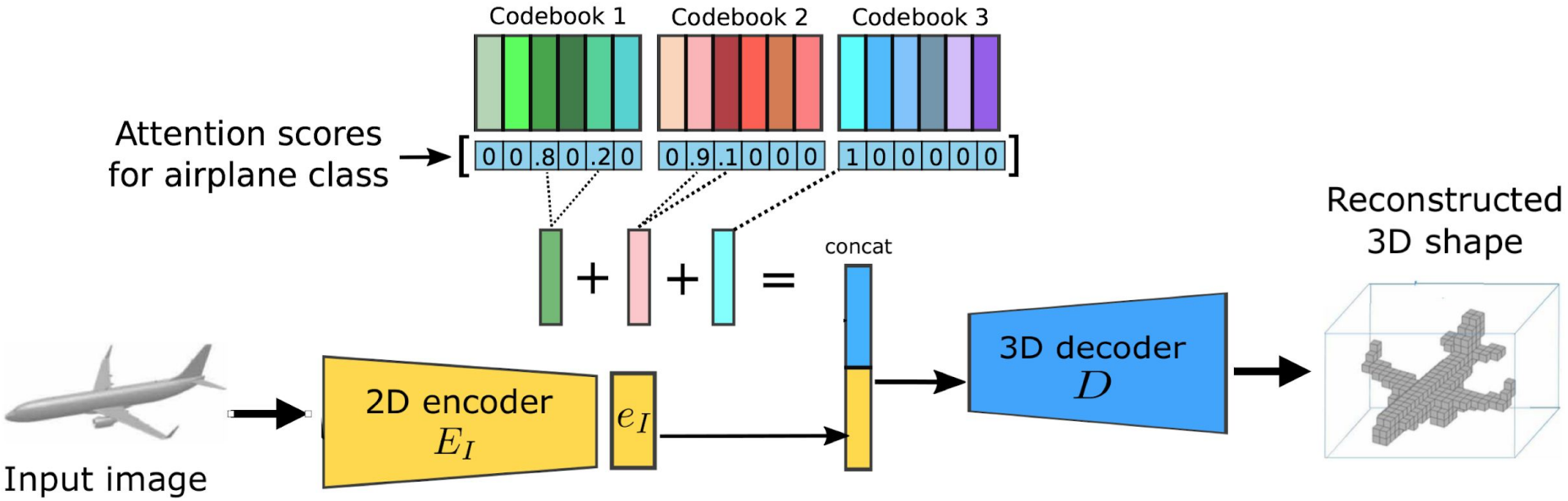
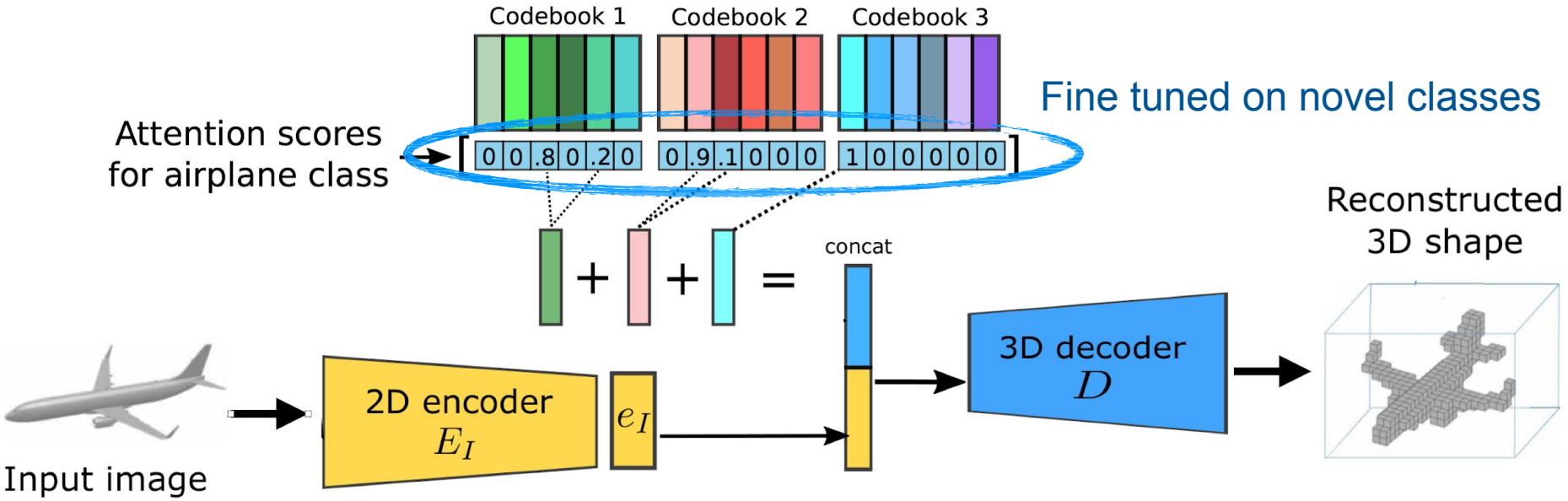
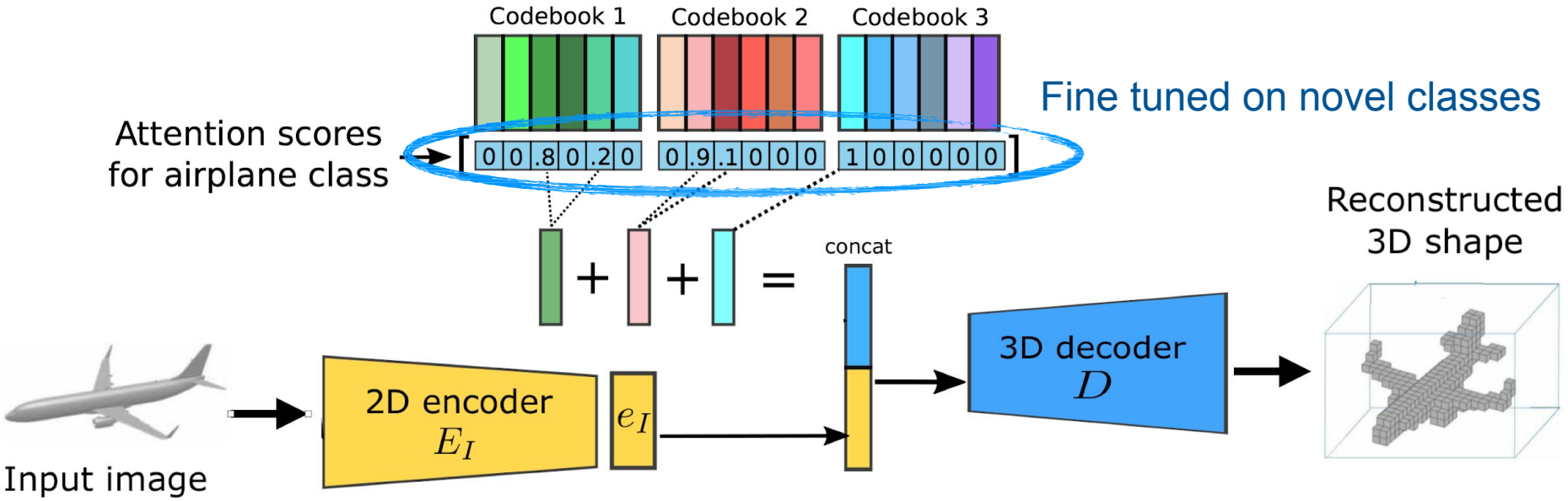
Our compositional method



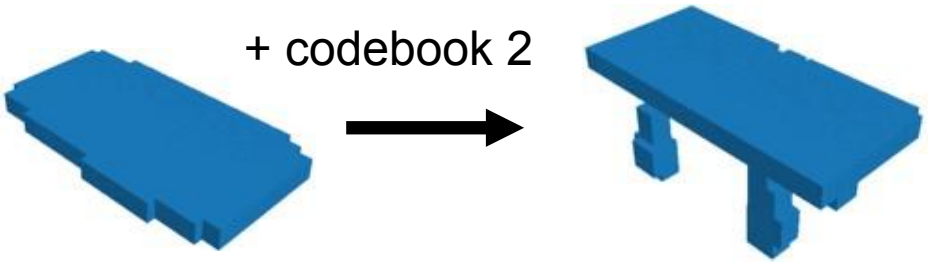
Our compositional method



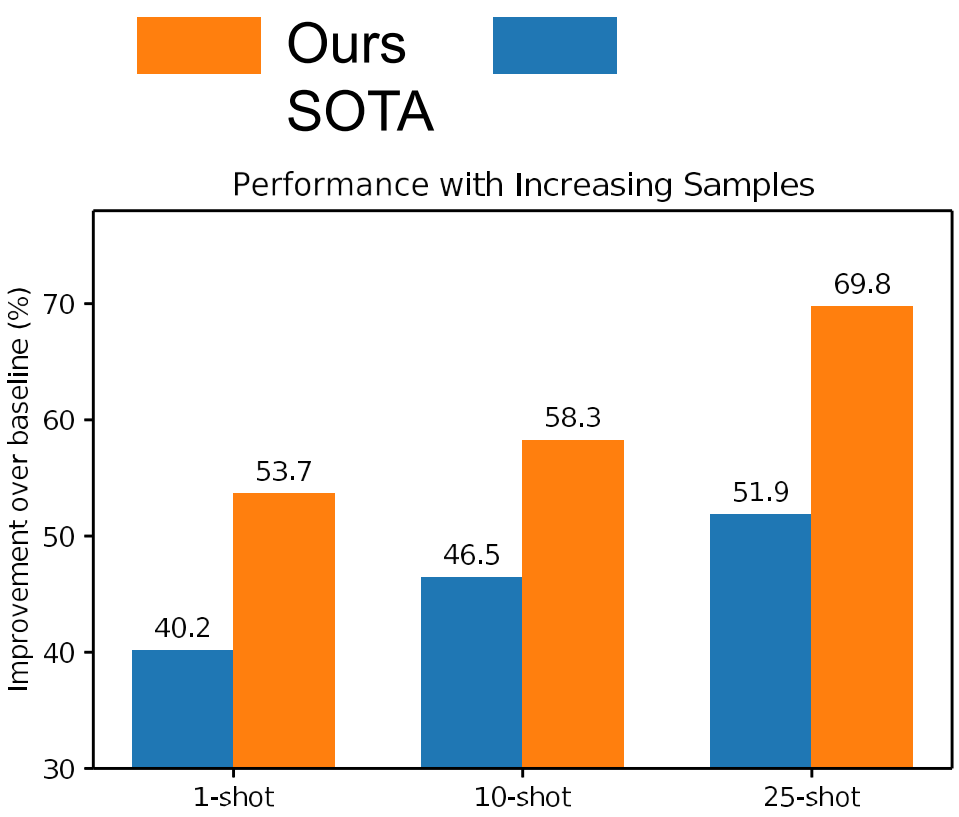
Our compositional method

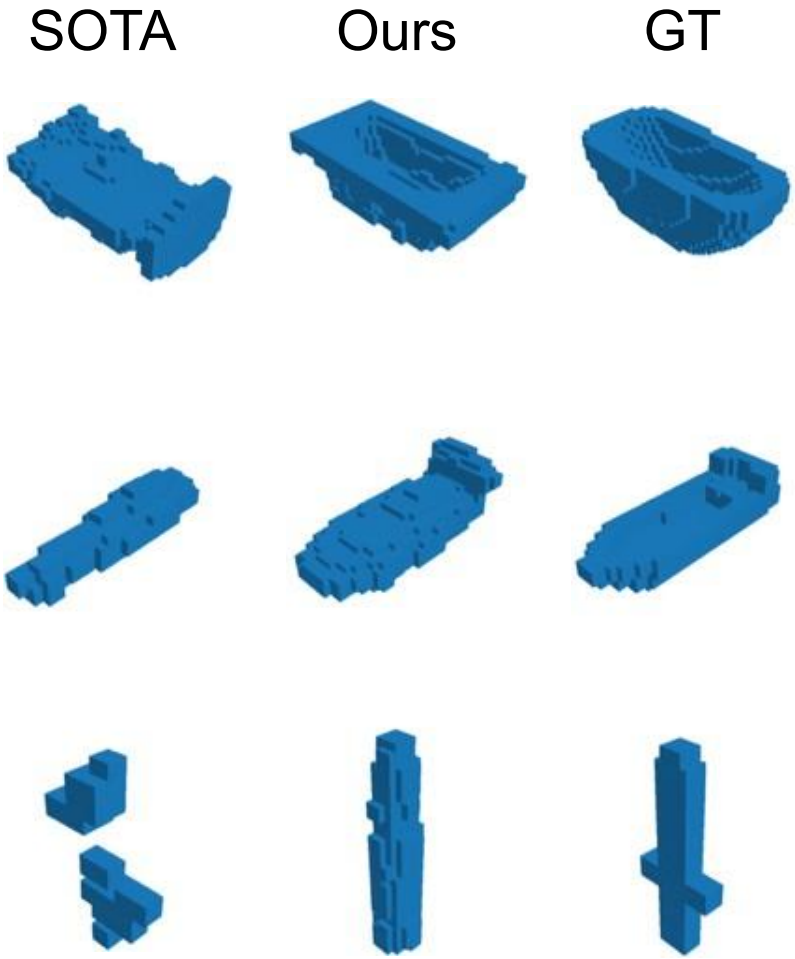


Learning shared concepts across classes !



Results


Ours
SOTA
Performance with Increasing Samples
Improvement over baseline (%)
70
60
50
40
30
40.2
53.7
46.5
58.3
51.9
69.8
1-shot
10-shot
25-shot


SOTA
Ours
GT

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