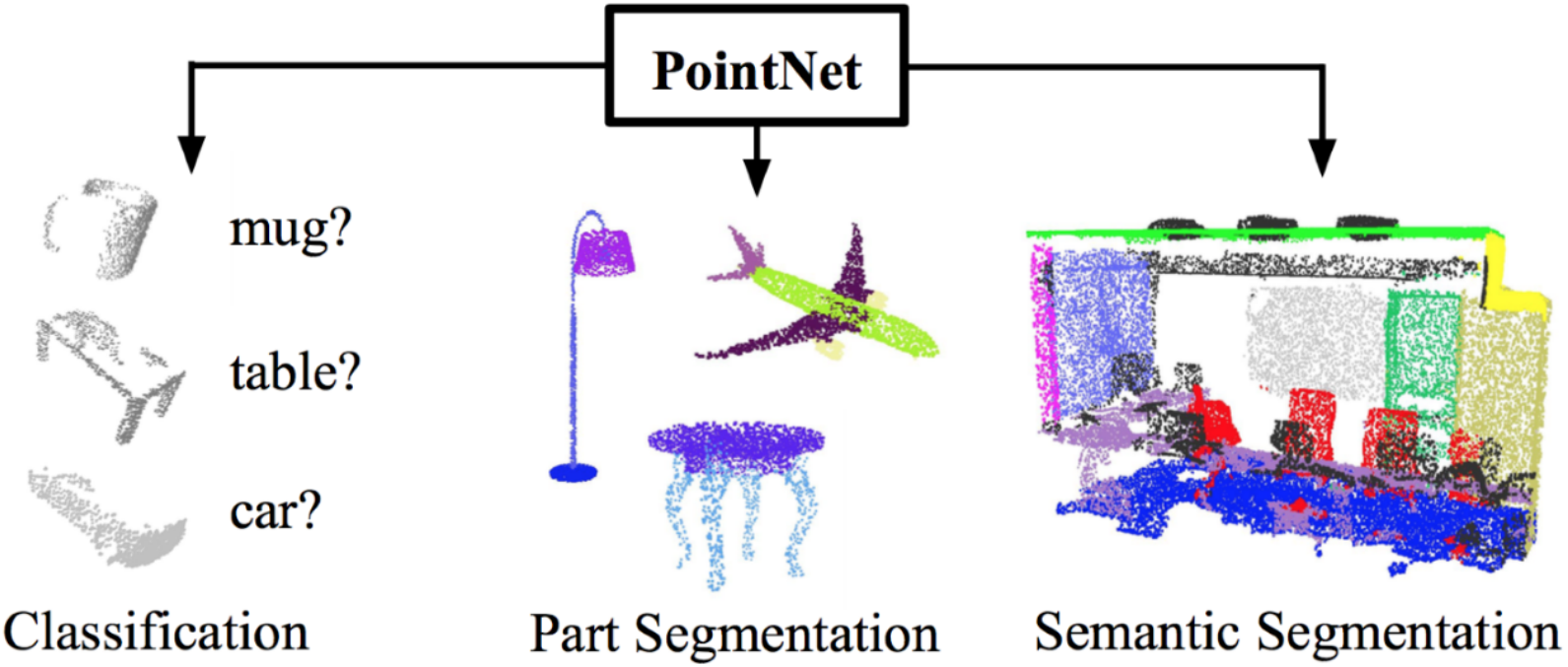
PointNet++: Deep Hierarchical Feature Learning on Point Sets in a Metric Space
NIPS 2017

Point Net

End-to-end learning for **scattered, unordered** point data

Unified framework for various tasks



Challenges

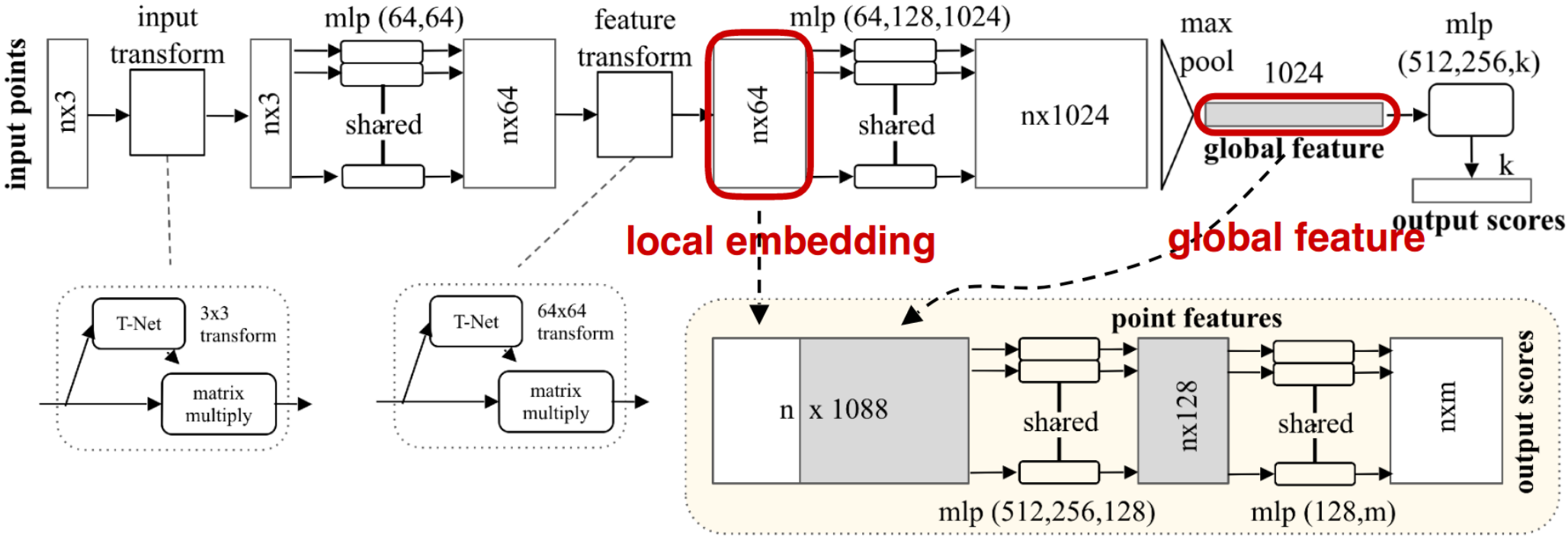
Unordered point set as input

Model needs to be invariant to N! permutations.

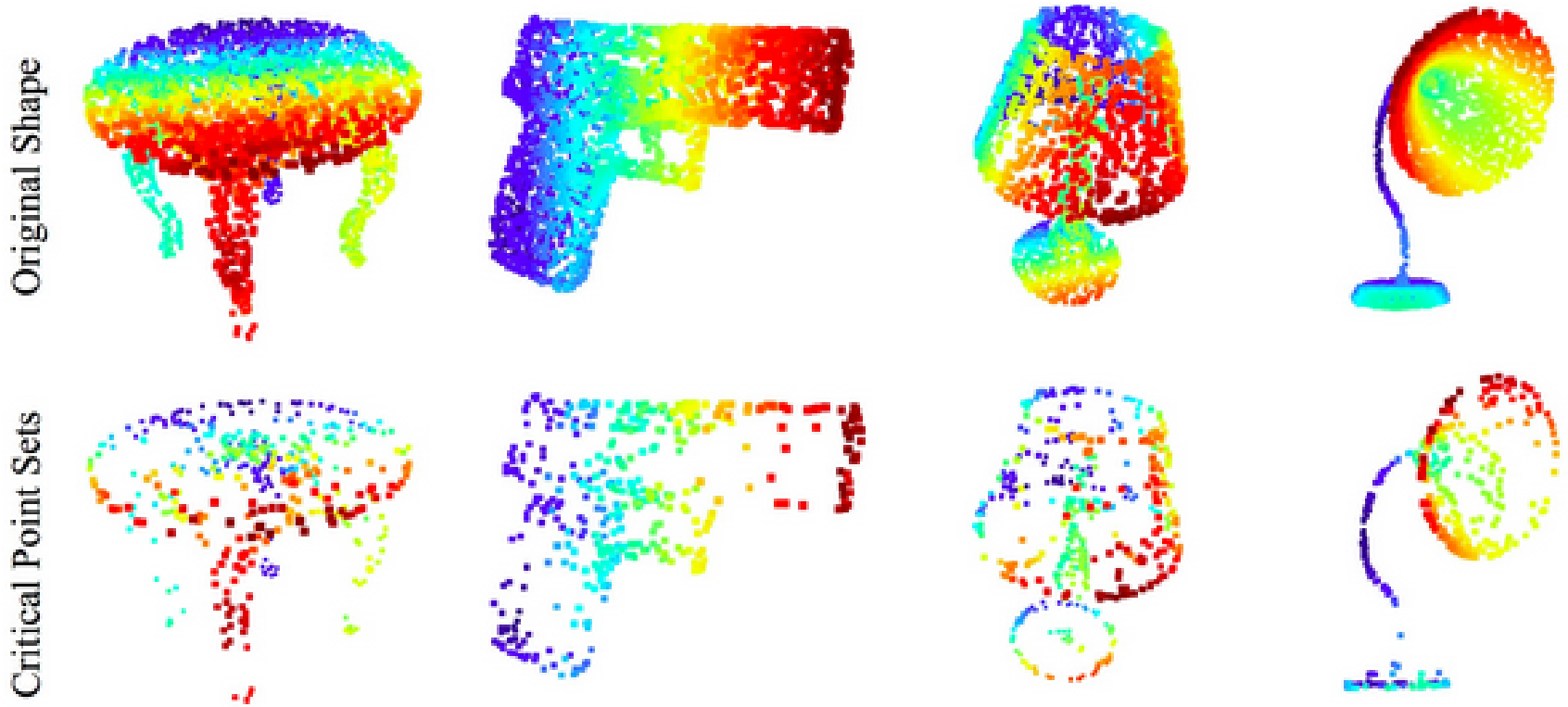
Invariance under geometric transformations

Point cloud rotations should not alter classification results.

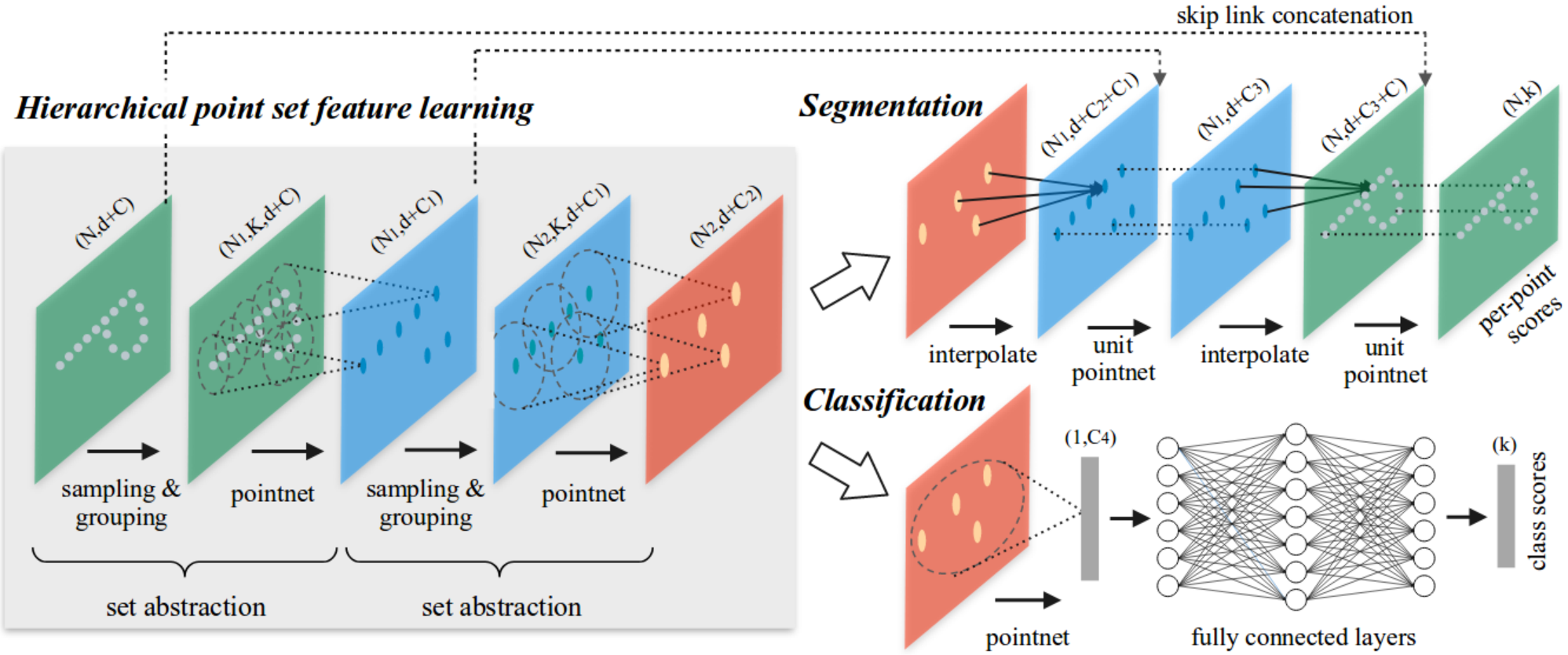
PointNet Network



Limitations
Lack of local context



Farthest point sampling + Point net



Non-uniform sampling density

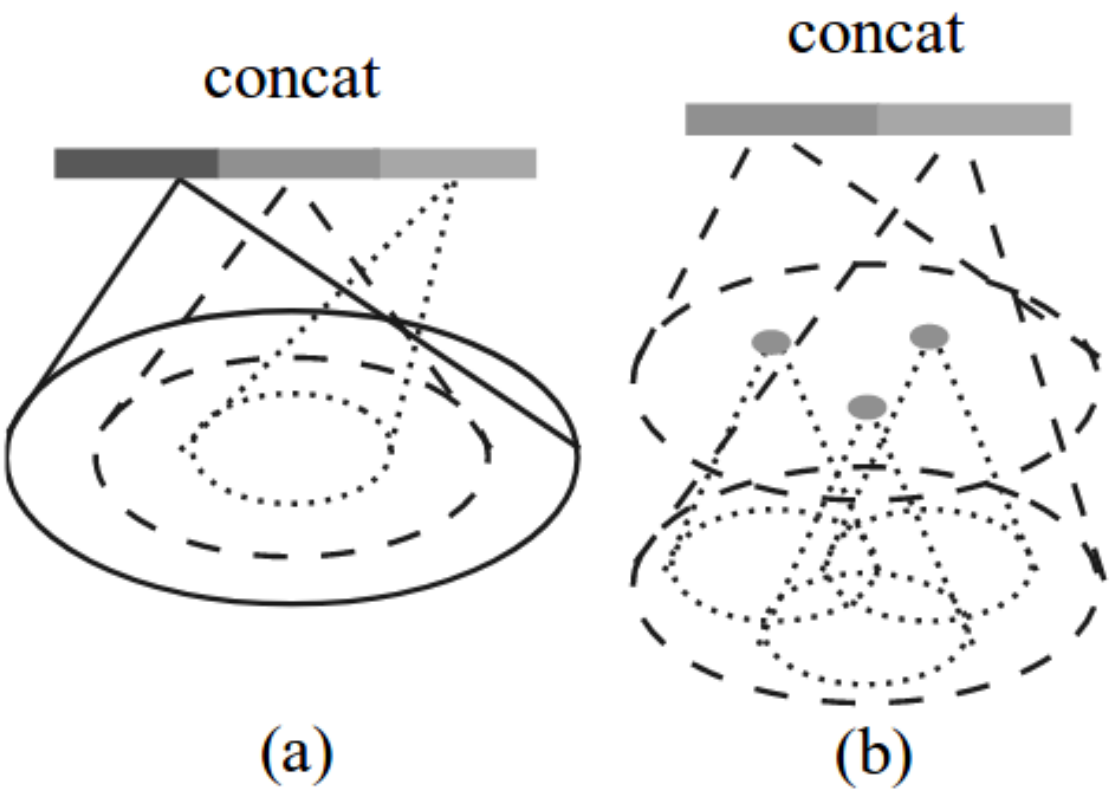
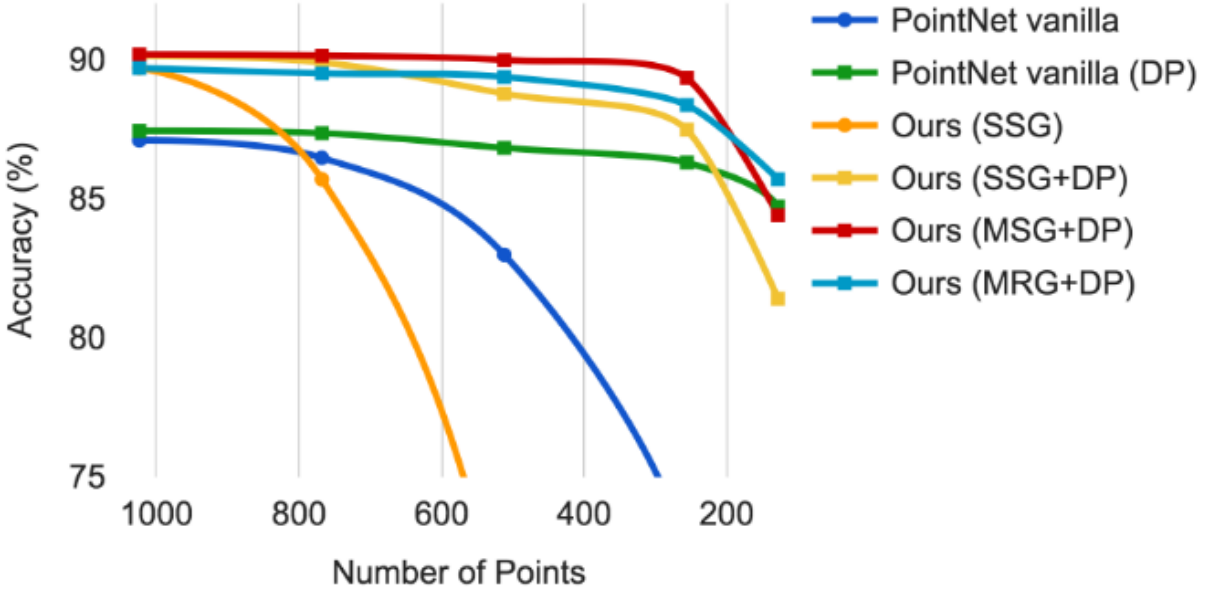


Figure 3: (a) Multi-scale grouping (MSG); (b) Multi-resolution grouping (MRG).

Classification results

Method	Input	Accuracy (%)
Subvolume [21]	vox	89.2
MVCNN [26]	img	90.1
PointNet (vanilla) [20]	pc	87.2
PointNet [20]	pc	89.2
Ours	pc	90.7
Ours (with normal)	pc	**91.9**

Table 2: ModelNet40 shape classification.



Segmentation results